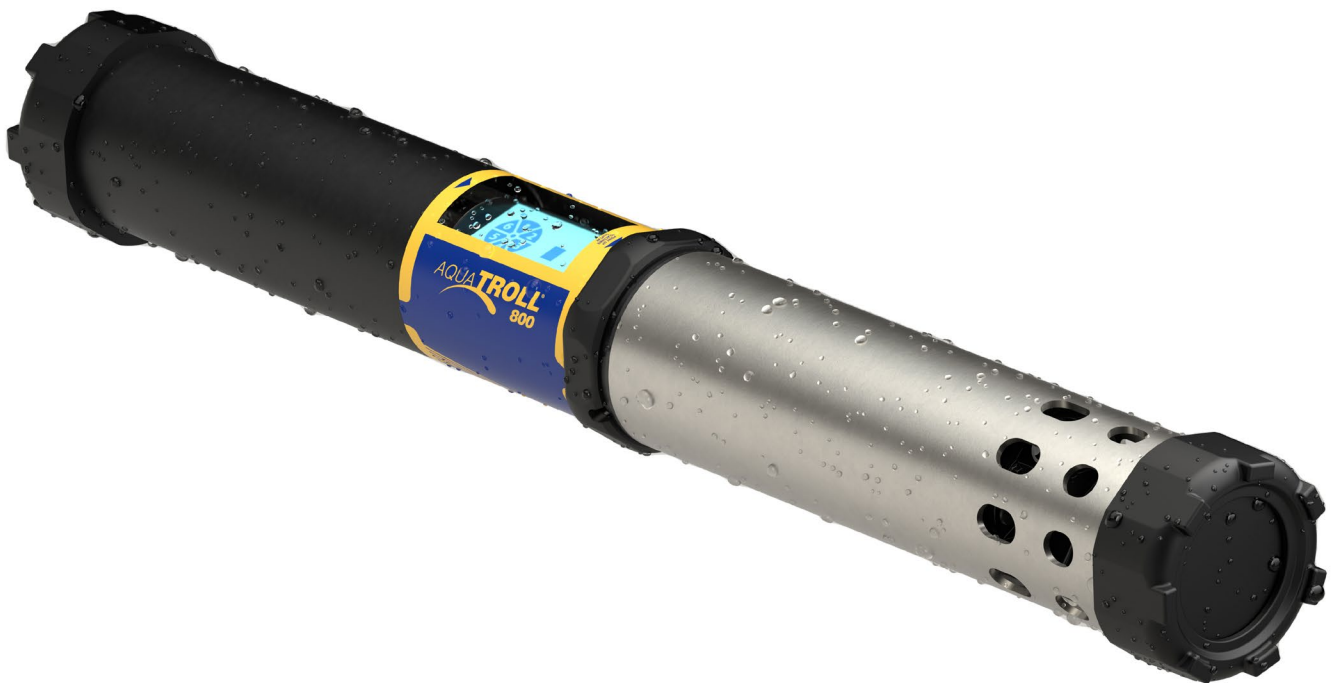


***Operator's Manual***



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For a list of local compliance representatives, see <https://in-situ.com/us/faq/regulatory-compliance/compliance-information/global-market-contacts>

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# Introduction

## Serial Number Location

The instrument serial number is on the product label affixed to the instrument body. Serial numbers for individual sensors are engraved on the sensor body.

## Instrument Description

The Aqua TROLL 800 uses the latest sensor and electronics technology to provide laboratory-quality measurements for field use. Parameters include water level, pH, dissolved oxygen, and more. The Aqua TROLL 800 is designed for applications that require parameters from up to 6 sensors with a single instrument. An optional water level/pressure sensor and a barometric pressure sensor are integrated into the sonde. Additional sensors may be selected and replaced to suit your project's needs. An optional motorized sensor wiper may also be included on the instrument.

Use the Aqua TROLL 800 for long-term monitoring in freshwater and marine environments. It's also ideal for the following applications:

- Coastal monitoring
- Surface water monitoring
- Environmental monitoring
- Regulatory compliance
- Aquaculture
- Remediation
- Stormwater monitoring
- Profiling

The built-in LCD screen displays battery status, connectivity info, and other vital information. Setup is easy with the VuSitu app and a Bluetooth-enabled mobile device. The Aqua TROLL 800 records data to internal memory and to a micro SD card simultaneously. It can also work with external PLCs and integrates seamlessly with VuLink telemetry for remote data monitoring.

## Document Conventions

Throughout this document you will see the following symbols:



A checkmark highlights a tip or feature.



The exclamation point calls your attention to a requirement, safety issue, or important action that should not be overlooked.

## Unpacking and Inspecting

Your equipment was carefully inspected before shipping. Check the equipment for any physical damage sustained during shipment. Notify In-Situ and file a claim with the carrier if there is any such damage; do not attempt to deploy or operate the instrument.



Save packing materials for future storage and shipping of your equipment.

Accessories may be shipped separately and should be inspected for physical damage and order fulfillment.

# Safety



Read the safety information on this page before deploying or configuring your Aqua TROLL 800. If you have questions, contact In-Situ Technical Support for assistance.

- Use only D-cell alkaline batteries.
- Do not use the Aqua TROLL 800 in any manner not specified by the manufacturer.
- Do not use batteries of different ages or types.
- Do not submerge the Twist-Lock connector ends of the cable or instrument when they are not connected.
- Do not submerge the Wireless TROLL Com or your mobile device in liquid.
- Ensure that sensors or sensor plugs, are completely inserted into the ports, so that no liquid can enter the instrument.
- Ensure that the RDO Sensor Cap is pressed firmly over the sensor lens and is flush with the instrument before submerging in liquid.
- Replace the cable if insulation or connectors are damaged.
- Make sure the probe and sensor O-rings are clean and free of damage.

## ***Intended Use***

The Aqua TROLL® 800 Multiparameter Sonde is designed to be safe:

- during indoor or outdoor use;
- in ambient temperatures from -5 to 50° C;
- above or below 2000 m;
- in any relative humidity levels;



If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

## Instrument Specifications

|  |  |
|--|--|
| Operating temperature  | -5 to 50° C (23 to 122° F)<br>Nitrate and Ammonium Sensors: 0 to 40° C (32 to 104° F)<br>Chloride Sensors: 0 to 50° C (32 to 122° F)   |
| Storage temperature  | Components without fluid: -40 to 65° C (-40 to 149° F)<br>pH/ORP sensors: -5 to 65° C (23 to 149° F)<br>Nitrate and Ammonium Sensors: 0 to 40° C (32 to 104° F)<br>Chloride Sensors: 0 to 50° C (32 to 122° F) |
| Dimensions   | Diameter: 7.21 cm (2.84 in) O.D. without bumpers;<br>8.23 cm (3.24 in) O.D. with bumpers<br>Length: 63.70 cm (25.08 in.) (includes connector)<br>With bail: 74.72 cm (29.42 in.)                               |
| Weight   | 3.23 kg (7.12 lbs) - includes all sensors, batteries, and bail   |
| Wetted materials<br>(sonde and sensors)                                    | Buna-N, Noryl™, Nylon, Polyphenylsulfone, Polycarbonate,<br>Acetal, EPDM/Polypropylene TPV, FKM Fluoroelastomer, Titanium,<br>Flourocarbon Coating, Ceramic, Acrylic Adhesive Film                             |
| Environment rating   | IP68 with all sensors and cable attached. IP67 with sensors removed or<br>cable detached   |
| Max pressure rating  | Up to 350 PSI<br>Ammonium/Nitrate up to 30 PSI   |
| Communication  | RS485/MODBUS, SDI-12, Bluetooth®   |
| Reading rate   | 1 reading every 2 seconds for one parameter, no wipe   |
| Internal memory  | 16 MB  |
| Additional memory, micro SD<br>card <sup>2</sup>                           | 16+ GB included, any size micro SD up to 32 GB accepted  |
| Logging rate   | 1 minute to 99 hours   |
| Logging modes  | Linear, Linear Average   |
| Data logging   | 50 logs (defined, scheduled to run, or stored)   |
| LCD screen   | Integrated display shows status of sonde, sensor ports, data log,<br>battery, and connectivity   |
| Internal power<br>Battery life <sup>3</sup>                                | (2) user-replaceable D-cell alkaline batteries<br>> 6 months typical with wiping<br>> 9 months typical without wiping  |
| External power voltage <sup>4</sup><br>External power current <sup>4</sup> | 8-36 VDC<br>Sleep: < 0.2 mA typical<br>Measurement: 40 mA typical, 75 mA Max   |
| Cable  | Vented or non-vented polyurethane or vented Tefzel®  |

|                    |  |
|--------------------|--|
| Hex screw driver   | 0.050 in. (1.3 mm)   |
| Software interface | Android/iOS: VuSitu Mobile App (see app store for OS requirements)<br>Data Services: HydroVu   |
| Certifications     | CE, FCC, WEEE, RoHS, UKCA Compliant  |
| Warranty           | 2 year - sonde, sensors (excluding ISE Sensors)<br>1 year - Nitrate, Chloride, and Ammonium Sensors<br>Other - see warranty policy at <a href="http://www.in-situ.com">www.in-situ.com</a>                   |
| Notes              | Specifications are subject to change without notice. Android is a trademark of Google, Inc. Bluetooth is a trademark of Bluetooth SIG, Inc. Noryl is a registered trademark of SHPP Global Technologies B.V. |

<sup>1</sup>For 30 parameters > 100,000 data records, > 3 years at 15 minute interval. A single data record includes timestamp, temperature, RDO, pH, ORP, turbidity, and conductivity logged in Linear or Linear Average mode.

<sup>2</sup>Log data recorded to SD card in comma delimited variable (CSV) file format.

<sup>3</sup>Logging all sensors at 15 minute interval on 2 D-cell alkaline batteries. Battery life dependent on site conditions and wiping.

<sup>4</sup>Dependent on display and wiping

## ***External Power Source Requirements***



Current from an external power source must not exceed 4 amps.

## About the Aqua TROLL 800

The Aqua TROLL 800 is a scientific instrument for water monitoring. It's capable of measuring numerous water-quality parameters at the same time. These parameters include:

- pH
- ORP
- Dissolved oxygen
- Turbidity
- Conductivity
- Temperature
- Pressure
- BGA-PE Fluorescence
- BGA-PC Fluorescence
- Chloride
- Chlorophyll-a Fluorescence
- Nitrate
- FDOM Fluorescence
- Crude oil Fluorescence
- Fluorescein
- Rhodamine
- Total Dissolved Solids
- Total Suspended Solids

## Features

This instrument supports six removable wet-mate sensors and an optional wiper to keep sensor faces clean.

The Aqua TROLL includes an LCD screen that displays sensor status and instrument details. Additionally, the Aqua TROLL 800 includes internal memory and logging capabilities.

## Instrument Dimensions



## Exploded View 1



## Exploded View 2



## End View

Flat edge of connector aligns with flat edge of Rugged Cable.



## Sensor Detail

6 Interchangeable sensors

Wiper or wiper plug





# Sensor Specifications

## Sensor Summary

| Sensors             | Expected Lifetime*   | Recommended Calibration Frequency | Pressure Rating - PSI | Usable Depth |     | Operational Temperature Range |
|---------------------|----------------------|-----------------------------------|-----------------------|--------------|-----|-------------------------------|
|                     |                      |                                   |                       | m            | ft  |                               |
| pH/ORP              | 2 years or greater** | 10 to 12 weeks**                  | 350                   | 250          | 820 | - 5 to 50° C                  |
| RDO                 | 2 years or greater   | 12 months**                       | 350                   | 250          | 820 | - 5 to 50° C                  |
| Conductivity        | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| Temperature         | 2 years or greater   | NA                                | 350                   | 250          | 820 | - 5 to 50° C                  |
| Turbidity           | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| Pressure            | 2 years or greater   | User calibration only if needed   | 12.8                  | 9            | 30  | - 5 to 50° C                  |
|                     |                      |                                   | 14.2                  | 10           | 33  |                               |
|                     |                      |                                   | 42.7                  | 30           | 100 |                               |
|                     |                      |                                   | 108                   | 76           | 250 |                               |
|                     |                      |                                   | 142                   | 100          | 328 |                               |
|                     |                      |                                   | 285                   | 200          | 650 |                               |
|                     |                      |                                   | 350                   | 250          | 820 |                               |
| Barometric Pressure | 2 years or greater   | User calibration only if needed   | NA                    | NA           | NA  | - 5 to 50° C                  |
| Ammonium            | 6 to 12 months**     | Monthly**                         | 30                    | 25           | 70  | 0 to 40° C                    |
| Chloride            | 1 year or greater**  | Monthly**                         | 350                   | 250          | 820 | 0 to 50° C                    |
| Nitrate             | 6 to 12 months**     | Monthly**                         | 30                    | 25           | 70  | 0 to 40° C                    |
| Chlorophyll a       | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| BGA-PC              | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| BGA-PE              | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| Rhodamine           | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| Fluorescein         | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| FDOM                | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |
| Crude Oil           | 2 years or greater   | User calibration only if needed   | 350                   | 250          | 820 | - 5 to 50° C                  |

\* Expected lifetime includes total shelf life and deployment lifetime.

\*\* Lifetime and calibration frequency depend on site and storage conditions.

## Solutions

| Solution  | Shelf Life - Unopened                                    | Shelf Life - Opened   |
|---|--|---|
| Quick Cal                                       | 4 months. Store in a cool, dark place. Shake before use. | 7 to 21 days ( $\pm 10$ mV, $\pm 0.05$ pH, $\pm 50$ $\mu\text{S}/\text{cm}$ ) |
| ZoBell's  | 9 months. Store in a cool, dark place.                   | 3 to 6 months   |
| Low Conductivity (147 $\mu\text{S}/\text{cm}$ ) | 12 months  | Hours ( $\pm 1$ $\mu\text{S}/\text{cm}$ , check before use)                   |
| Other Conductivity                              | 12 months  | 3 to 6 months   |
| pH Calibration Buffers                          | 24 months  | 3 to 6 months   |
| Sensor Reference Filling Solution               | 24 months  | 12 months   |
| pH Storage Solution                             | 24 months  | 12 months   |
| Sodium Sulfite                                  | 12 months  | 3 to 6 months   |
| Turbidity                                       | 12 months  | 12 months from expiration date  |
| Deionized Water                                 | 24 months  | Hours, check before use for calibration                                       |
| Ammonium  | 12 months  | 3 to 6 months   |
| Chloride  | 12 months  | 3 to 6 months   |
| Nitrate   | 12 months  | 3 to 6 months   |

## Potential Interferents

### pH

Sodium salts (at pH >12)

### Dissolved Oxygen

Temperature, atmospheric pressure, salinity, chlorinity

### Ammonium

Cesium, Potassium, Thallium, pH, Silver, Lithium, Sodium

### Nitrate

Perchlorate, Iodide, Chlorate, Cyanide, Bromide, Nitrite, Hydrogen Sulfide (bisulfite), Hydrogen Carbonate (bicarbonate), Carbonate, Chloride, Dihydrogen Phosphate, Hydrogen Phosphate, Phosphate, Acetate, Fluoride, Sulfate

### Conductivity

Temperature

### ORP

Ions that are stronger reducing agents than hydrogen or platinum, e.g., chromium, vanadium, titanium, etc.

### Chloride

Hydroxide, Ammonia, Thiosulfate, Bromide, Sulfide, Iodide, Cyanide

### BGA-PC, BGA-PE, Chlorophyll a, Rhodamine WT

Turbidity

## RDO Cap Chemical Incompatibility



The following chemicals will damage the RDO sensing element.

- Alcohols > 5%
- Hydrogen peroxide > 3%
- Sodium hypochlorite (commercial bleach) > 3%
- Gaseous sulfur dioxide
- Gaseous chlorine
- Do not use in organic solvents (e.g., acetone, chloroform, methylene chloride, etc.), which may destroy the sensing element

## Conductivity/Temperature Sensor



Soaking the Conductivity/Temperature sensor in vinegar for longer than one hour can cause serious damage.

## Ammonium, Chloride, and Nitrate Interferent Concentrations

### Ammonium

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of  $\text{NH}_4^+$ .

| Ion                        | 100 ppm $\text{NH}_4^+$ | 10 ppm $\text{NH}_4^+$ | 1 ppm $\text{NH}_4^+$ |
|----------------------------|-------------------------|------------------------|-----------------------|
| Cesium ( $\text{Cs}^+$ )   | 100                     | 10                     | 1                     |
| Potassium ( $\text{K}^+$ ) | 270                     | 27                     | 2.7                   |
| Thallium ( $\text{Tl}^+$ ) | 3100                    | 310                    | 31                    |
| pH ( $\text{H}^+$ )        | pH 1.6                  | pH 2.6                 | pH 3.6                |
| Silver ( $\text{Ag}^+$ )   | 270,000                 | 27,000                 | 2,700                 |
| Lithium ( $\text{Li}^+$ )  | 35,000                  | 3,500                  | 350                   |
| Sodium ( $\text{Na}^+$ )   | 11,100                  | 1,100                  | 110                   |

### Chloride

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of  $\text{Cl}^-$ .

| Ion   | 100 ppm $\text{Cl}^-$ | 10 ppm $\text{Cl}^-$ | 1 ppm $\text{Cl}^-$  |
|---|-----------------------|----------------------|----------------------|
| Hydroxide ( $\text{OH}^-$ )                 | 3,840                 | 384                  | 38.4                 |
| Ammonia ( $\text{NH}_3$ )                   | 6                     | 0.6                  | 0.06                 |
| Thiosulfate ( $\text{S}_2\text{O}_3^{2-}$ ) | 3                     | 0.3                  | 0.03                 |
| Bromide ( $\text{Br}^-$ )                   | 0.68                  | 0.068                | $6.8 \times 10^{-3}$ |
| Sulfide ( $\text{S}^{2-}$ )                 | $9 \times 10^{-5}$    | $9 \times 10^{-6}$   | $9 \times 10^{-7}$   |
| Iodide ( $\text{I}^-$ )                     | $1.8 \times 10^{-4}$  | $1.8 \times 10^{-5}$ | $1.8 \times 10^{-6}$ |
| Cyanide ( $\text{CN}^-$ )                   | $1.5 \times 10^{-5}$  | $1.5 \times 10^{-6}$ | $1.5 \times 10^{-7}$ |

### Nitrate

The table below lists concentrations of possible interfering ions that cause 10% error at various levels (in ppm) of  $\text{NO}_3^-$ .

| Ion                                | 100 ppm $\text{NO}_3^-$ | 10 ppm $\text{NO}_3^-$ | 1 ppm $\text{NO}_3^-$ |
|------------------------------------|-------------------------|------------------------|-----------------------|
| Perchlorate ( $\text{ClO}_4^-$ )   | $7 \times 10^{-2}$      | $7 \times 10^{-3}$     | $7 \times 10^{-4}$    |
| Iodide ( $\text{I}^-$ )            | 4                       | 0.4                    | 0.04                  |
| Chlorate ( $\text{ClO}_3^-$ )      | 30                      | 3                      | 0.3                   |
| Cyanide ( $\text{CN}^-$ )          | 20                      | 2                      | 0.2                   |
| Bromide ( $\text{Br}^-$ )          | 400                     | 40                     | 4                     |
| Nitrite ( $\text{NO}_2^-$ )        | 230                     | 23                     | 2                     |
| Hydrogen Sulfide ( $\text{HS}^-$ ) | 230                     | 23                     | 2                     |

|   |         |        |       |
|---|---------|--------|-------|
| Bicarbonate (HCO <sub>3</sub> <sup>-</sup> )                        | 440     | 440    | 44    |
| Carbonate (CO <sub>3</sub> <sup>2-</sup> )                          | 8,600   | 860    | 86    |
| Chloride (Cl <sup>-</sup> )   | 7,600   | 760    | 76    |
| Dihydrogen Phosphate (H <sub>2</sub> PO <sub>4</sub> <sup>-</sup> ) | 34,640  | 3,464  | 346   |
| Hydrogen Phosphate (HPO <sub>4</sub> <sup>2-</sup> )                | 34,300  | 3,430  | 343   |
| Phosphate (PO <sub>4</sub> <sup>3-</sup> )                          | 33,900  | 3,390  | 339   |
| Acetate (OAc <sup>-</sup> )   | 104,200 | 10,420 | 1,042 |
| Fluoride (F <sup>-</sup> )  | 81,400  | 8,140  | 814   |
| Sulfate (SO <sub>4</sub> <sup>2-</sup> )                            | 685,700 | 68,570 | 6,857 |

### Fluorometer Wavelengths

| Sensor        | Excitation Wavelength (nominal) | Detection Wavelength |
|---------------|---------------------------------|----------------------|
| Chlorophyll a | 430 nm                          | 675 nm to 750 nm     |
| BGA-PC        | 590 nm                          | 640 nm to 690 nm     |
| BGA-PE        | 498 nm                          | 575 nm to 625 nm     |
| Rhodamine     | 530 nm                          | 580 nm to 660 nm     |
| Fluorescein   | 462 nm                          | 525 nm to 570 nm     |
| FDOM          | 375 nm                          | 455 nm to 530 nm     |
| Crude Oil     | 365 nm                          | 430 nm to 505 nm     |

### Additional Information

For additional sensor details including accuracy, range, resolution, methodology, detection limits, response time, and more, view the [Aqua TROLL specification sheet at www.in-situ.com](http://www.in-situ.com).

## Required Accessories

### Communication Device

You can use a communication device to calibrate, configure and deploy the Aqua TROLL 800.



#### Wireless TROLL Com

Provides power to the Aqua TROLL 800 to extend battery life.

Calibrate, configure, and deploy with a Bluetooth-enabled Android or iOS device.

### Telemetry + Communication Device



#### VuLink

Provides power to the the Aqua TROLL 800 in remote-monitoring applications

Calibrate, configure, and deploy with a Bluetooth-enabled Android or iOS device.

Send data to HydroVu or an external FTP Server

---

### Software



#### VuSitu Mobile App

Calibrate, configure and deploy the Aqua TROLL 700 from a Bluetooth-enabled Android or iOS device.

**Get it from your device's app store.**

## Cable



## Rugged Twist-Lock Cable

Connects the Aqua TROLL 800 to a Wireless TROLL Com or VuLink.

Vented or non-vented.

Stripped and tinned available for connecting to 3rd-party equipment

## Sensors



## Available Sensors

1. Temperature
2. Conductivity/temperature
3. pH/ORP
4. RDO
5. Turbidity
6. Ammonium
7. Chloride
8. Nitrate
9. Chlorophyll a Fluorescence
10. BGA-PC Fluorescence
11. BGA-PE Fluorescence
12. Rhodamine WT
13. Fluorescein WT
14. FDOM Fluorescence
15. Crude Oil Fluorescence

## System Components

| <b>Sensors</b>   |                    |
|--|--------------------|
| RDO Sensor - includes RDO-X Cap  | 0063450            |
| RDO Sensor - includes RDO Fast Cap   | 0038520            |
| Combination pH/ORP Sensor  | 0063470            |
| Turbidity Sensor   | 0063480            |
| Combination Conductivity/Temperature Sensor or standalone Temperature Sensor | 0063460, 0063490   |
| Ammonium Sensor  | 0033700            |
| Nitrate Sensor   | 0033710            |
| Chloride Sensor  | 0033720            |
| Chlorophyll A Sensor   | 0038900            |
| Phycocyanin (BGA-PC) Sensor  | 0038920            |
| Phycoerythrin (BGA-PE) Sensor  | 0038930            |
| Rhodamine WT Sensor  | 0038890            |
| Fluorescein WT Sensor  | 0096050            |
| Crude Oil Sensor   | 0096060            |
| Fluorescent Dissolved Organic Matter (FDOM) Sensor                           | 0096070            |
| Sensor Port Plugs (2)  | 0063510            |
| <b>Communications</b>  |                    |
| Wireless TROLL Com for Android   | 0031240            |
| Mobile Device for Android  | 0064860            |
| TROLL Com RS-232 Cable Connect   | 0056140            |
| TROLL Com USB Cable Connect  | 0052500            |
| TROLL Com RS-232 Direct Connect  | 0056150            |
| TROLL Com USB Direct Connect   | 0052510            |
| <b>Accessories</b>   | <b>Part Number</b> |
| Alkaline Batteries (2)   | 0042020            |
| Dual Titanium Restrictor/Storage Chamber                                     | 1012140            |
| Rubber Bumpers (2)   | 1012150            |
| Wiper or Wiper Port Plug   | 1012110, 1012130   |



|   |             |
|---|-------------|
| <b>Cable</b>  |             |
| Stripped-and-tinned Cable with male connector   | 0053310     |
| Twist-lock Bulkhead Connector   | 0053240     |
| Twist-lock Backshell/Hanger, Titanium   | 0051480     |
| Cable Extender  | 0051490     |
| Large Desiccant (titanium connector)  | 0051810     |
| Large Desiccant (ABS connector)   | 0053550     |
| Small Desiccant (3 pack) - storage desiccant  | 0052230     |
| Desiccant Refill Kit for Large or Outboard Desiccant                                    | 0029140     |
| <b>Calibration and Maintenance</b>  |             |
| RDO Classic Cap Replacement Kit   | 0079790     |
| pH/ORP Replacement Reference Junction Kit   | 0078990     |
| Wiper Brush Kit   | 1012120     |
| Maintenance Kit   | 1014170     |
| Copper Antifouling Guard  | 1014500     |
| Quick-Cal Solution for calibrating DO, Cond., pH & ORP                                  | 0033250     |
| Dissolved Oxygen Calibration Kit  | 0032110     |
| Conductivity Calibration Kit (Full)   | 0032090     |
| Conductivity Calibration Kit (Low)  | 0032630     |
| Conductivity Calibration Kit (High)   | 0032640     |
| pH Calibration Kit  | 0032080     |
| pH/ORP Calibration Kit  | 0032120     |
| pH Storage Solution   | 0065370     |
| Individual Calibration Solutions  | See website |
| Ammonium Calibration Kit (includes 1 liter each: 14 ppm, 140 ppm, 1400 ppm, DI water)   | 0032140     |
| Chloride Calibration Kit (includes 1 liter each: 35.5 ppm, 355 ppm, 3545 ppm, DI water) | 0032150     |
| Nitrate Calibration Kit (includes 1 liter each: 14 ppm, 140 ppm, 1400 ppm, DI water)    | 0032130     |
| Fluorescein WT Solid State RFU Calibrator   | 1012180     |
| FDOM Solid State RFU Calibrator   | 1012170     |
| Crude Oil Solid State RFU Calibrator  | 1012190     |

## RuggedCable System

RuggedCable Systems are custom-built, durable, direct-read cables that include the following items:

- Titanium twist-lock connectors for quick, reliable connections to the instrument, desiccant, and communication cable
- Metal shield beneath the cable jacket to prevent electrical interferences
- Kellems grip for secure instrument deployment
- Small desiccant for vented systems (for storage only)

### Vented or Non-Vented Cable

Vented cable is used with vented pressure sensors to produce gauged measurements. The cable vent tube ensures that atmospheric pressure is applied to the back of the sensor diaphragm.

Non-vented cable is used with non-vented instruments for absolute measurements. Compensate absolute measurements by using a VuLink and HydroVu.



Vented cable is shipped with a small desiccant to protect against condensation. Larger desiccants are necessary for deployment.

### Jacket Options

Tefzel (vented) or thermoplastic polyurethane (TPU, vented or non-vented)

### Customizable Cable Lengths

Cables can be ordered up to 1,219 m (4,000 ft).

### Cable Termination

Cables can be ordered with a twist-lock termination (female connector) on both ends that connect to the instrument, the TROLL Com Communication Device, desiccant, and other accessories.

Cables can also be ordered with stripped-and-tinned termination for wiring to a data logger or controller using SDI-12 or Modbus communication protocol.



|   |  |
|---|--|
| 1 | RuggedCable System with female to female connectors  |
| 2 | Stripped-and-tinned RuggedCable System with female connector   |
| 3 | Stripped-and-tinned RuggedCable System with male connector (short length that converts a cable with a twist-lock connector to a stripped-and-tinned cable) |



## Box Contents

1. Instructions
2. Instrument with sensors and wiper or wiper plug installed
3. Hex Wrench
4. Screwdriver
5. RDO Sensor Cap (if RDO Sensor is included)
6. Batteries
7. pH/ORP or ISE Sensors (if selected)
8. Accessories
9. pH maintenance kit (if pH/ORP or ISE sensors are included)

## Getting Started

### 1 Install the batteries.



Unscrew the battery cover to remove it.



Bend rubber cover back and insert the batteries.



Replace the battery cover.



Your Aqua TROLL 800 ships with all sensors installed except for pH/ORP or ISE sensors. If your instrument does not include pH/ORP or ISE sensors, all six sensors are installed by the factory. All sensors are factory calibrated and do not need to be recalibrated unless required by site procedures.

### 2 Install the RDO Cap (RDO sensor only).



Remove the restrictor.



Use included hex wrench to loosen set screw on RDO sensor.



Use the small hole at the bottom of the sensor to lever the sensor out.



Remove the dust cover from the RDO sensor.



Install the RDO cap on the sensor.



Insert RDO sensor into instrument sensor port.



Tighten screw at base of sensor with hex wrench. Do not overtighten.

### 3 Install the pH/ORP Sensor or ISE Sensors.



Remove tape and cap from sensor.



Apply a pea-sized drop of lubricant to sensor O-rings.



Insert sensor in empty sensor port.



Tighten screw at base of sensor with hex wrench. Do not overtighten.

### 4 Prepare Instrument for Deployment.



(Optional) Install restrictor with vent holes at base of instrument for calibration.



(Optional) Calibrate sensors. Calibration procedures may be found in user manual.

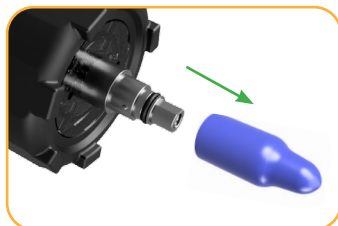


After calibration, flip the restrictor with the vent holes away from the center of the instrument.

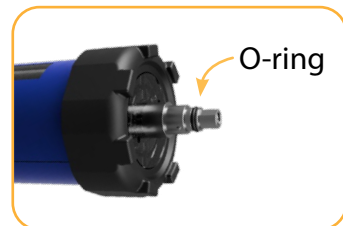


Install the end cap on the restrictor for deployment.

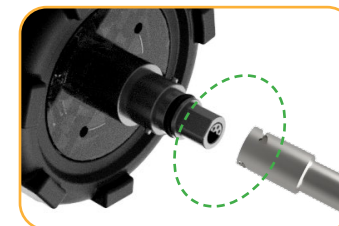
### 5 Connect the Rugged Cable and communication device.



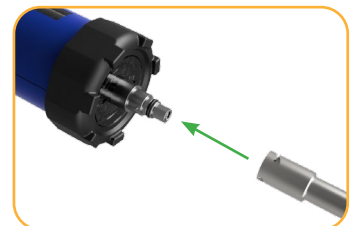
Remove protective caps from instrument and cable.



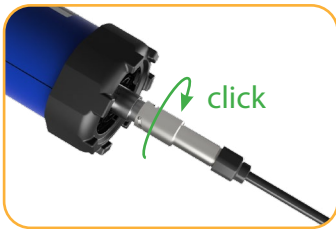
Apply a pea-sized drop of grease to the O-ring.



Align the flat edges of the instrument connector and the cable.



Slide connector into the cable end.



Twist and push the sleeve until you hear a click.



If desiccant is present, remove it from cable.



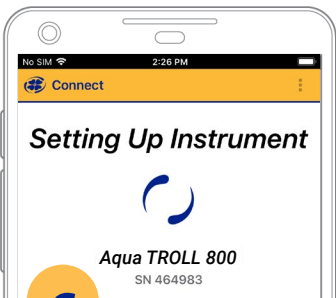
Align TROLL Com connector with cable end. Push and twist until you hear a click.

## 6 Connect to the software.



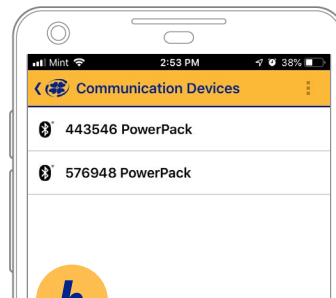
You must have the VuSitu mobile app to use the instrument with a mobile device. Download VuSitu from the Google Play Store or the Apple App Store.

### iOS



**a**

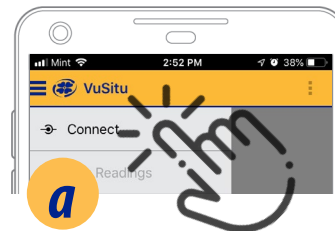
An iOS device automatically connects to the closest In-Situ instrument.



**b**

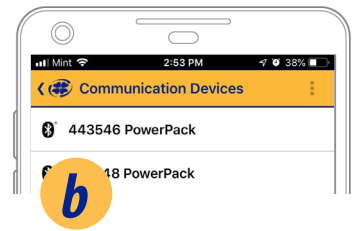
To connect to another instrument, press **Disconnect** and then **Choose or Add Device**. VuSitu displays a list of available connections.

### Android



**a**

Launch VuSitu and tap **Connect**.



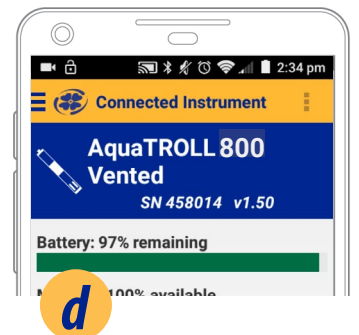
**b**

The app locates and displays nearby In-Situ devices.



**c**

Tap the serial number of the instrument or Wireless TROLL Com.



**d**

VuSitu displays the Connected Instrument screen when pairing is complete.



VuSitu's on-screen instructions will guide you through instrument calibration, logging, live readings, and data sharing.



# Parameters and Sensors

## Using the RDO Sensor and Sensor Cap



The wiper can severely reduce the life of the RDO Fast Cap. Wear will vary by application. Verify sensor performance prior to use and replace the Fast Cap if damaged.

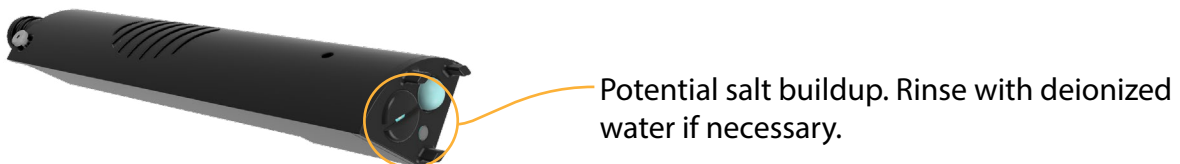


Do not look directly at the sensor LED or point it at the eyes. Doing so can cause eye damage.

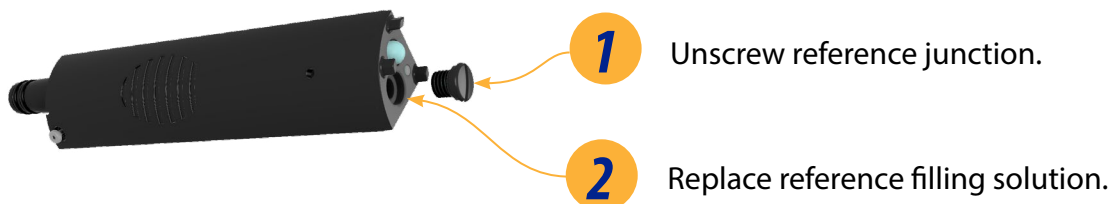
## Handling pH and Ion-Selective Electrode Sensors



Salt may accumulate around the reference junctions of the ammonium, chloride, nitrate and pH sensors. Rinse with deionized water to remove any buildup.



Before using the **ISE sensors** for the first time, replace the reference filling solution. Condition the sensors by soaking in calibration standard for 4-24 hours prior to deployment. This step is not necessary for the pH sensor.



## Using Ion-Selective Electrode Sensors



ISE sensors require one or more additional sensors to function. See the details below and install the required sensors to use an ISE.

### Ammonium Sensor Requirements

**Conductivity/  
Temperature Sensor**



*or*

**Temperature Sensor**



To calculate ammonia...

**Conductivity/  
Temperature Sensor**



*and*

**pH Sensor**



### Chloride, Nitrate, and pH/ORP Sensor Requirements

**Conductivity/  
Temperature Sensor**



*or*

**Temperature Sensor**

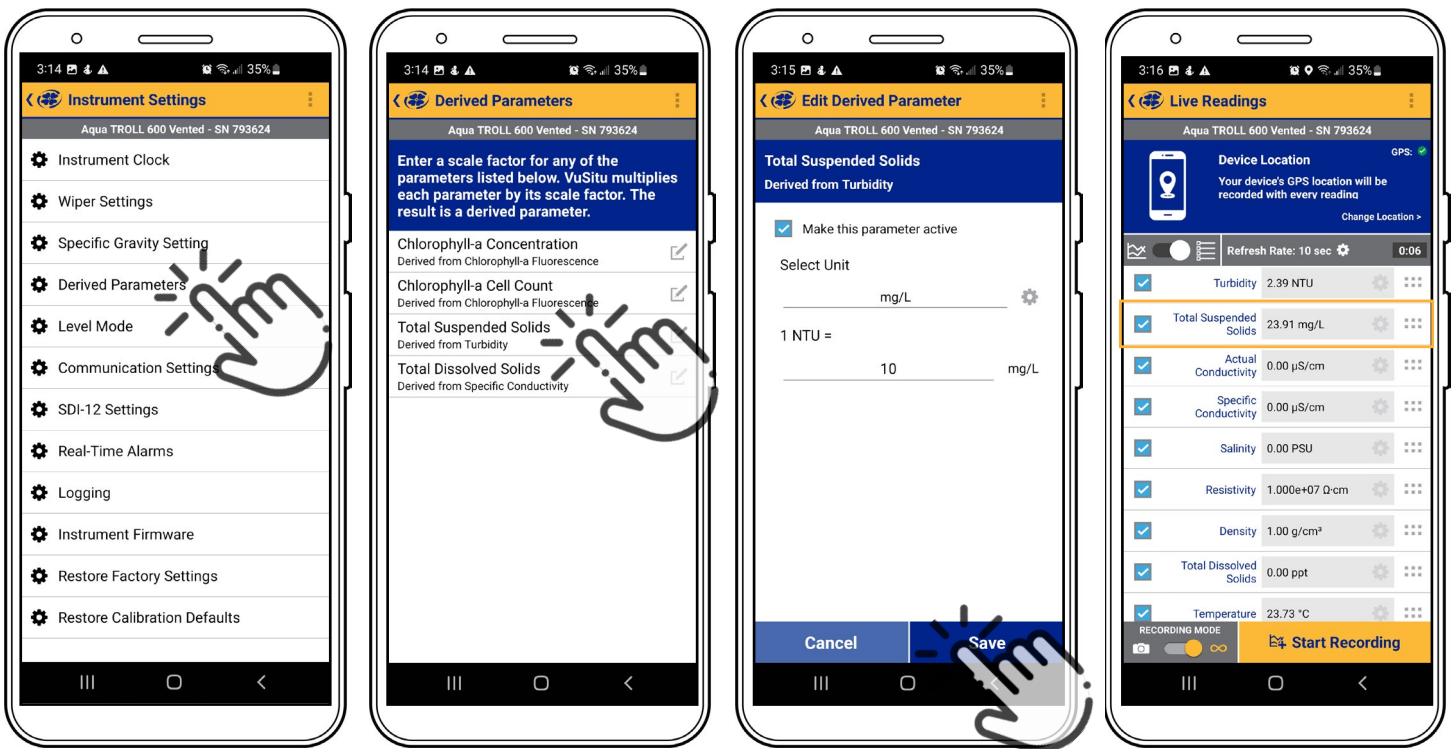


## Derived Parameters

VuSitu can derive estimates for additional parameters based on correlations with measured parameters. Scale factors for derived parameters are unique for each deployment site, so they must be determined by laboratory analysis of grab samples. Examples of derived parameters include:

- TDS (Derived from Conductivity and Temperature)
- TSS (Derived from Turbidity and Temperature)
- BGA-PC and BGA-PE Concentration (Derived from Relative Fluorescence)
- Chlorophyll a Concentration (Derived from Relative Fluorescence)
- Chlorophyll a Cell Count (Derived from Relative Fluorescence)
- FDOM Concentration (Derived from Relative Fluorescence)
- Crude Oil Concentration (Derived from Relative Fluorescence)

Enable derived parameters and input a scale factor in VuSitu under **Instrument Settings > Derived Parameters**.



Select **Derived Parameters** in the **Instrument Settings** menu.

View the list of available derived parameters. Select the edit icon to configure a parameter.

Select units and enter a linear scale factor. Scale factors are highly site-specific and must be determined by laboratory analysis of grab samples.

The derived parameter is now listed next to measured parameters.



# LCD Screen



View instrument status and start a basic log via the LCD screen.

## Starting a Basic Log



Use the steps below to start a log when connection to VuSitu is not possible. If no logs are ready to start, a basic log will be created to record all available parameters every 15 minutes.



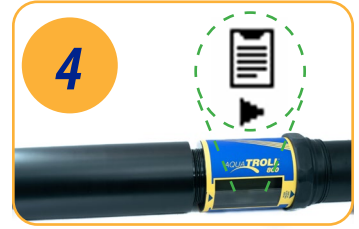
Remove the battery cover.



To create a basic log on the instrument, press the button inside the battery cover 5 times.



Replace the battery cover.



The LCD screen will show that the log has been started.

## Possible Port Statuses



Sensors installed



Port plugs installed



Sensor/port error

## Possible Power Statuses



Battery level indicator



External power provided



Battery below 10% or Battery error

## Possible Log Statuses



Log is Running



Log is Scheduled



Log is Paused



No Log Set Up

## Possible Connected Statuses



Connected via Bluetooth



Connected via cable

## Error Messages



Port(s) empty



RDO Cap expired!

RDO cap is reaching the end of its expected lifespan.



Refer to the VuSitu section of this manual for information on Instrument Bluetooth.

## Full-Text Messages

The LCD will display text messages instead of status icons when certain conditions are met. The highest priority status will display until it is resolved.

| Text Message                | Cause and Remedy  |
|-----------------------------|---|
| Close battery cover         | Battery cover is not fully closed.<br>Ensure the battery cover is tightened.  |
| Install wiper               | Wiper sensor port is open.<br>Install wiper or wiper port plug into center port.  |
| Install all sensors         | Sensor ports are open.<br>Install sensors or sensor port plugs.   |
| Temperature Recommended     | No Temperature or Conductivity/Temperature sensor detected. Install a sensor with Temperature.  |
| Install RDO Cap             | RDO Cap not detected on RDO sensor. Install RDO cap.  |
| RDO Cap expired             | RDO cap is reaching the end of its expected lifespan.<br>Install a new RDO Cap if it is worn or damaged or if sensor is not calibrating properly. |
| RDO Cap: XXX days remaining | Temporary text message update on the lifespan of the RDO Cap.   |

## Micro SD Card

The Aqua TROLL 800 uses a micro SD card for data storage. You can remove the SD card and replace it with another for data download, or use the same card. An SD card is not required to log data.

### Removing the Micro SD Card

The micro SD card is housed in a slot near the positive battery terminal and the twist-lock connector.

1. Remove the battery cover from the end of the instrument.
2. Push the micro SD card in towards the instrument to release the card.
3. Remove the card from the slot.
4. To reinstall the card, push the card into the slot until you hear a click.

### Downloading and Deleting Data from the Micro SD Card

1. Remove card from the sonde and insert it into a micro SD card adapter.
2. Insert the adapter into a PC or laptop.
3. Open the micro SD card using the file explorer.
4. Open the folder titled "Serial Number.LOG." For example, "424690.LOG."



Logs are named by date and then number. For example, a log started on November 12, 2022 would be named "22111200.CSV" - 22 is the year, 11 is the month, 12 is the day, and 00 is the log number. If multiple logs are recorded on the same day the last number will increase by one for each consecutive log.

5. Select the logs you wish to download and move them to the destination.
6. Select the logs you wish to delete and press Delete on the keyboard. Deleted logs cannot be recovered.

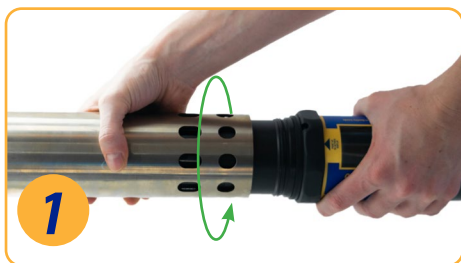
| <b>Error Code</b> | <b>Error Description</b>  | <b>Recommended Actions</b>   |
|-------------------|---|--|
| UC[0]             | User Calibration (UC) Expired   | 1.) Perform a user calibration on the sensor in a known calibration standard<br>2.) Follow individual sensor instructions or user SOPs for calibration.  |
| FC[0]             | Factory Calibration (FC) Expired  | Call (800-446-7488) or contact In-Situ Technical Support (support@in-situ.com). Send the instrument back to In-Situ for factory calibration  |
| OL                | Sensor Offline (OL) and no longer communicating with the instrument   | 1.) Remove sensor and check for water in the connection port. Dry sensor and sonde connector. Reinstall sensors. 2.) Remove two sensors and reinstall in separate port. 3.) Call (800-446-7488) or contact In-Situ Technical Support (support@in-situ.com).  |
| WU[0]             | Wiper Error - wiper is not turning correctly or interfering with sensor performance   | 1.) Inspect wiper to ensure surface is free of debris and the wiper is spinning correctly. 2.) Remove wiper brush and install a new brush holder with new brushes. 3.) Remove the wiper and check for water in the connection port. Dry the wiper port and the sonde connector. Reinstall wiper. 3.) Call (800-446-7488) or contact In-Situ Technical Support (support@in-situ.com).   |
| ERR[0]            | Sensor is performing outside of expected range  | 1.) Make sure the sensor is submerged in solution. 2.) Recalibrate sensor in a fresh batch of calibration standard. 3.) Reset sensor back to factory defaults and check reading in a calibration standard. Recalibrate. 4.) Call (800-446-7488) or contact In-Situ Technical Support (support@in-situ.com).  |
| DIS[0]            | Sensor is not set up correctly, being used outside of temperature or sensor range or returning a sentinel value due to internal malfunction or damage | 1.) Verify that the RDO sensor cap is installed, the sensing foil is intact and the cap has not expired. 2.) Clean the surface of the sensor to remove any excess debris 3.) Verify that the instrument and sensors are not being used outside of temperature or sensor specifications. 4.) Verify that the sensor is not physically damaged 5.) Call (800-446-7488) or contact In-Situ Technical Support (support@in-situ.com). |

# Calibrating Sensors

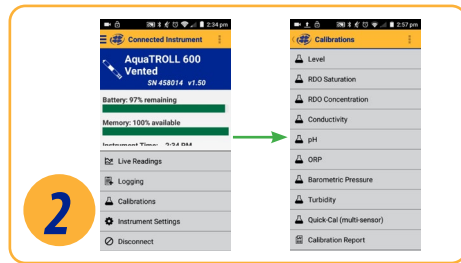
## Solution-Based Calibration

Use the solution-based procedure described below to calibrate all sensors except RDO and fluorometers (BGA-PC, BGA-PE, Chlorophyll-A, FDOM, Crude Oil, Fluorescein, and Rhodamine). You will need the following items.

- Calibration standard, or multiple standards for multi-point calibrations
- Bluetooth-enabled mobile device



Place the restrictor in calibration mode (holes near the center of the instrument).



In VuSitu, click Calibrations from the Connected Instrument screen and choose sensor to calibrate.



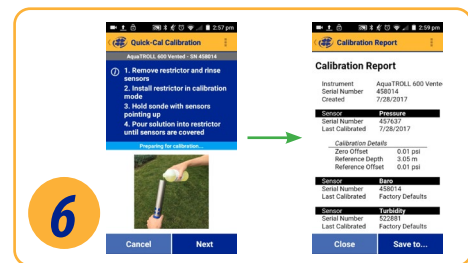
Remove cap from instrument and pour 20-40 mL of DI water into restrictor.



Gently shake the sonde in a circular motion to rinse the inside of restrictor and sensors.



Discard the DI water and repeat rinsing procedure two more times with 20-40 mL of your first calibration standard.



Pour 90 mL of calibration solution into the restrictor and cover with the end cap. Follow the instructions in VuSitu to start the calibration.

## Turbidity Sensor Calibration



You must calibrate the turbidity sensor with In-Situ's turbidity standard, or formazin. The app may not automatically detect the formazin concentration. Instead, a field will appear in which you can enter the appropriate value. Select **Set User Defined** to begin calibrating with the new value. If you are using an In-Situ standard and the app does not automatically detect it, perform the sensor cleaning and maintenance procedure, then select **Retry Auto Detect**.

## Fluorometer Calibration



Fluorometer sensors (BGA-PC, BGA-PE, Chlorophyll-A, FDOM, Crude Oil, Fluorescein, and Rhodamine) require more calibration solution than other solution-based calibrations. Use a solid-state calibrator for fluorometer calibrations if one is available. If solution-based calibration is required, use 180 mL of calibration solution for accurate calibration.



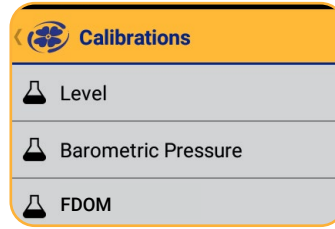
Do not look directly at the sensor LED or point it at the eyes. Doing so can cause eye damage from UV light emitted by the LED.



Place the restrictor in calibration mode (holes near the center of the instrument).



Connect to the VuSitu mobile app. Select **Calibrations**.



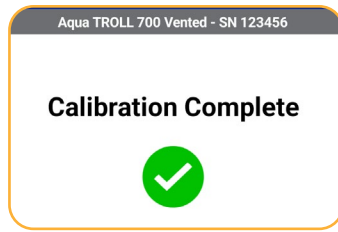
Select **FDOM** from the list of calibrations.



Place the calibrator in the end of the restrictor.



Enter the standard value from the top of the Calibrator.



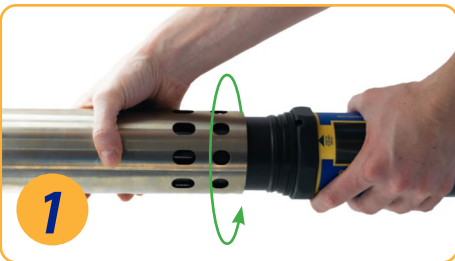
Follow the on-screen instructions to complete the calibration.



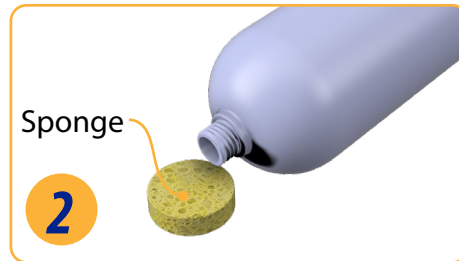
After calibrating, install the restrictor in deployment mode.

### **RDO 100% Saturation Calibration: Water Saturated Air**

Use the procedure below to calibrate the Aqua TROLL 800 RDO sensor, or see the next section for an alternative method.



Place the restrictor in calibration mode (holes near center of instrument).



Saturate a small sponge with water.



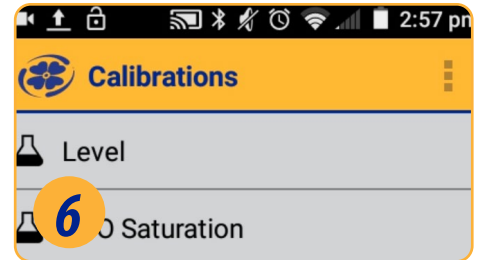
Place the sponge on the restrictor cap.



Loosely install the end cap, keeping the sensor face dry and allowing for air flow.



Leave sponge in restrictor for five minutes.



Follow the instructions in VuSitu to finish calibration.

## Calibrating with an Antifouling Restrictor

When using an antifouling restrictor, do not flip the restrictor into calibration mode. Instead, follow the steps below.



Leave the restrictor in deployment mode. Slide the calibration sleeve over the holes.



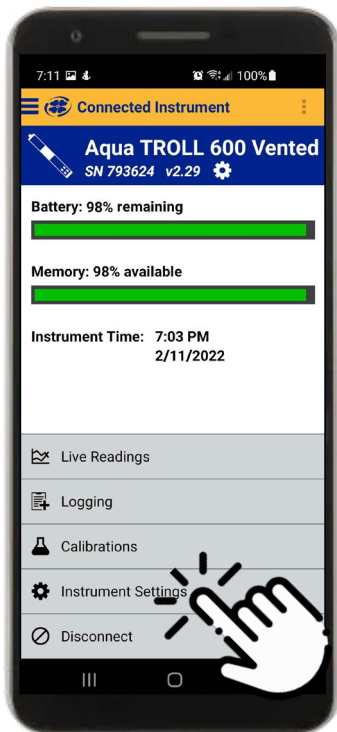
Calibration sleeve is ready when it clicks into place and is flush with the end of the restrictor.



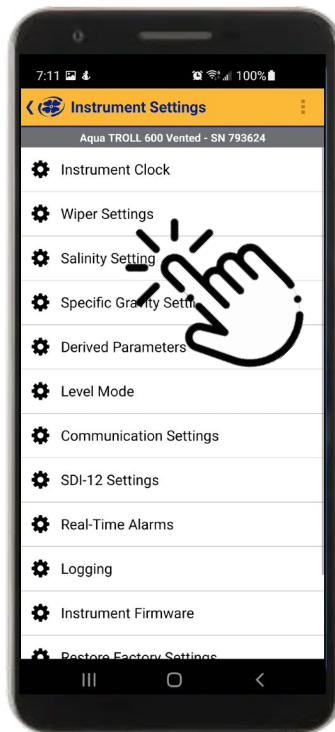
Continue the rest of the calibration as described above.

## RDO Salinity Setting

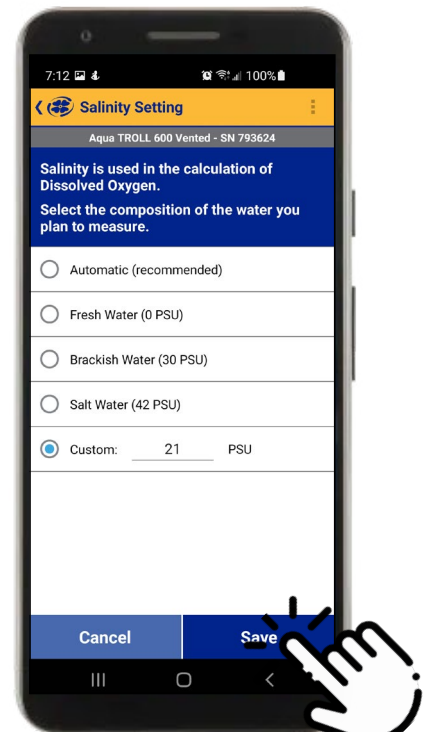
The Aqua TROLL 800 includes automatic salinity compensation. This feature requires a conductivity sensor and RDO sensor. With both sensors installed, the sonde uses salinity compensation by default. To change the compensation value, follow these steps:



Select **Instrument Settings** from the menu at the bottom of the screen.



From the Instrument Settings menu, select **Salinity Setting**.

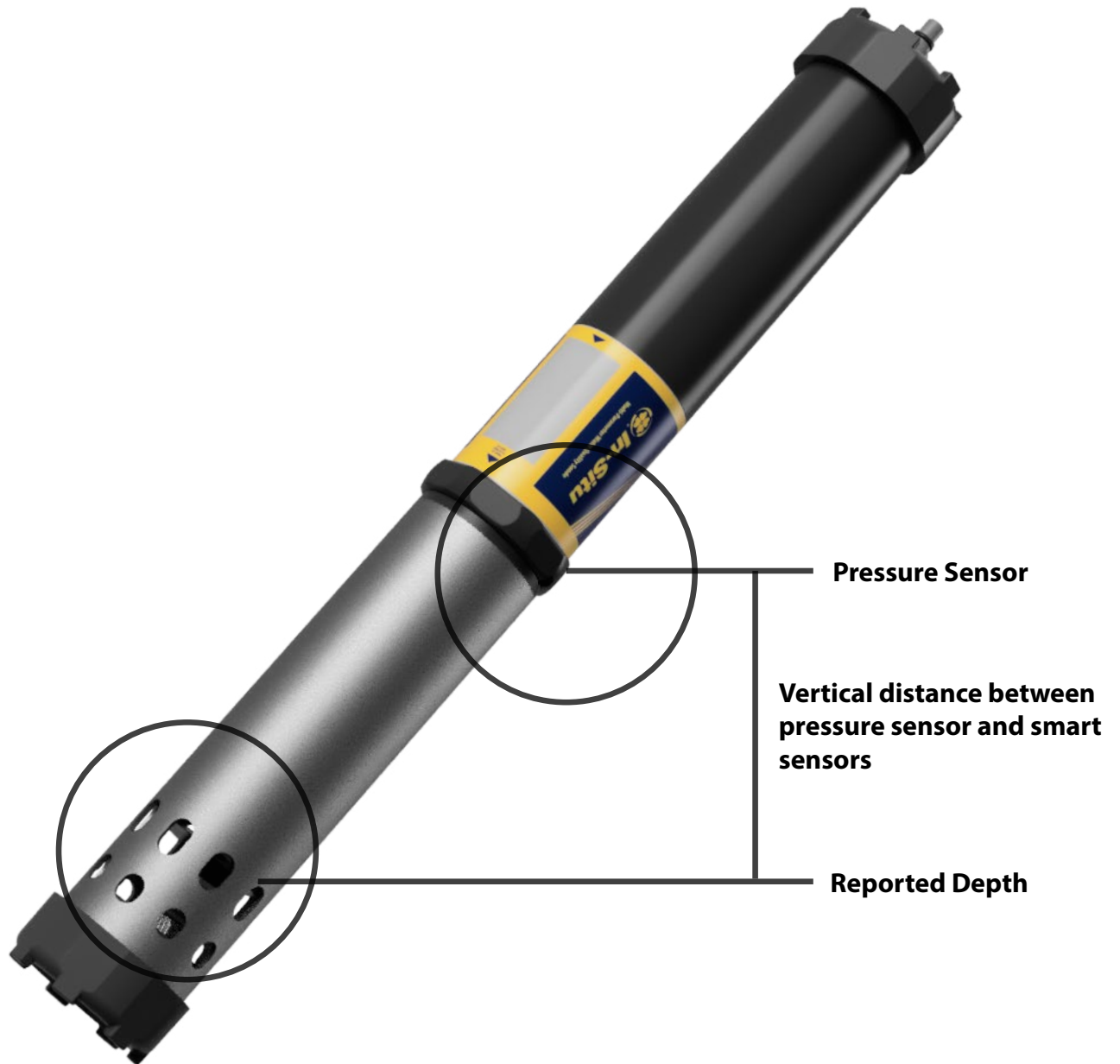


Enter your desired salinity compensation setting and press **Save**.



## Reported Depth

If a pressure sensor is included, Aqua TROLL 800 uses its pressure reading and specific gravity value to calculate depth. The pressure sensor is located at the center of the instrument, but depth is reported at the smart sensor faces. An embedded gyroscope compensates for the distance between these sensors and allows the sonde to be deployed in any orientation (vertical, horizontal, angled).



## Calibration Frequency Recommendations

In-Situ sensors are factory calibrated across the entire range of each sensor, and thus achieve a very high degree of accuracy and stability for extended periods of time without user calibration. In-Situ recommends inserting the instrument into a known calibration standard to check the accuracy of a sensor prior to performing any user calibration if you suspect drift, unless a user calibration is required by a standard operating procedure.

| Sensor                     | Recommended User Calibration Frequency                            | Recommended Factory Calibration Frequency | Notes  |
|----------------------------|---|---|--|
| Conductivity               | Only when required by user protocol                               | 12 months                                 | K-cell value: 0.7 to 1.3   |
| Conductivity + Temperature | Only when required by user protocol                               | 12 months                                 | K-cell value: 0.7 to 1.3   |
| pH                         | 10 to 12 weeks or as required by user protocol or site conditions | 12 months                                 | Single point:<br>Theoretical mV $\pm 30$ mV<br>2- or 3-point Slope:<br>-66 to 50 mV/pH<br>2- or 3-point Offset:<br>$\pm 30$ mV at pH 7 |
| ORP                        | 10 to 12 weeks or as required by user protocol or site conditions | 12 months                                 | Offset: $\pm 30$ mV  |
| RDO                        | 12 months or as required by user protocol                         | 12 months                                 | 2-point Slope:<br>0.7 to 1.3<br>2-point Offset:<br>$\pm 0.3$ mg/L  |
| Temperature                | Only when required by user protocol                               | Only when required by user protocol       | Offset: $\pm 0.5$  |
| Turbidity                  | Only when required by user protocol                               | 12 months                                 | Slope: 0.7 to 1.3  |
| Pressure/Depth             | Only when required by user protocol                               | Only when required by user protocol       | <2 times the full scale accuracy specification   |
| Barometer                  | Only when required by user protocol                               | Only when required by user protocol       | <2 times the full scale accuracy specification   |
| Ammonium                   | Monthly   | N/A                                       | Slope > 20 mV/decade   |
| Chloride                   | Monthly   | N/A                                       | Slope < -20 mV/decade  |
| Nitrate                    | Monthly   | N/A                                       | Slope < -20 mV/decade  |



|                |                                     |           |  |
|----------------|-------------------------------------|-----------|--|
| Chlorophyll a  | Only when required by user protocol | 12 months |  |
| BGA-PC         | Only when required by user protocol | 12 months |  |
| BGA-PE         | Only when required by user protocol | 12 months |  |
| Rhodamine WT   | Only when required by user protocol | 12 months |  |
| Fluorescein WT | Only when required by user protocol | 12 months |  |
| FDOM           | Only when required by user protocol | 12 months |  |
| Crude Oil      | Only when required by user protocol | 12 months |  |

### **Factory Calibration**

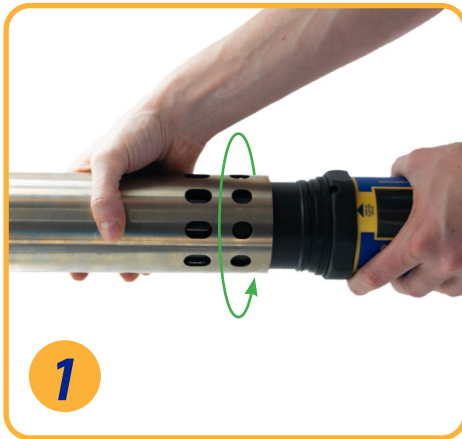
Factory calibration includes a thorough cleaning, full functionality check and sensor adjustments to all applicable sensors over the entire calibrated temperature range. We recommend a factory calibration every 12 months or when the unit appears to drift significantly.

# Batch Calibrating Sensors in VuSitu

## Different Sensor Types (Quick Cal Solution)



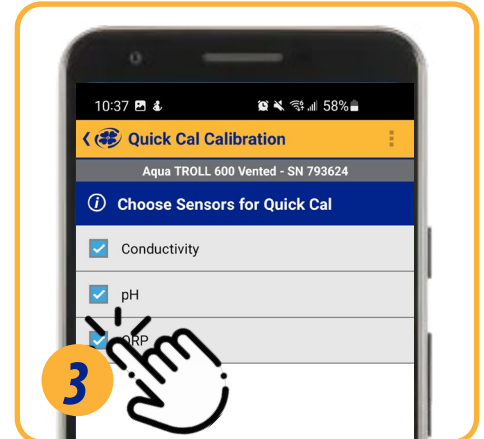
Use Quick Cal standard to calibrate conductivity, pH, and ORP with a single solution. Quick Cal solution can also be used for 100% RDO Saturation calibration. To calibrate multiple sensors of the same type, follow the instructions on the next page.



1 Install the restrictor in calibration mode (with holes closest to the instrument body).



2 In VuSitu, click **Calibrations** from the Connected Instrument screen. Choose **Quick Cal** from the menu.



3 Select sensors to calibrate.



4 Set up the calibration. Make sure that all sensors are completely submerged.



5 When all sensors have stabilized, tap **Accept**. Review the calibration report for the completed sensors.



6 Flip the restrictor back into deployment mode and install the end cap.

## Multiple Sensors of the Same Type



For some parameters (pH, ORP, RDO, turbidity, and conductivity), you can calibrate multiple sensors of the same type together. Use this feature when you need to batch calibrate a group of sensors prior to field deployment.



1 Install the sensors to calibrate. (pH/ORP sensors also require a temperature sensor.) Install the restrictor in calibration mode.



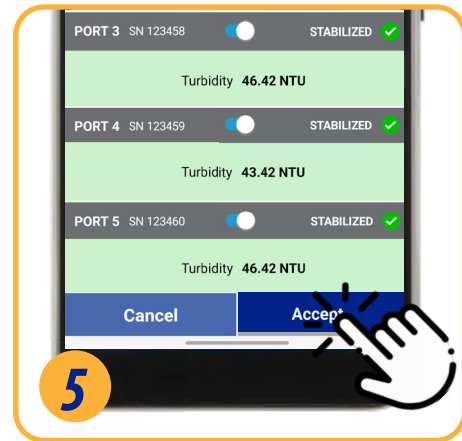
2 In VuSitu, click **Calibrations** from the Connected Instrument screen. Choose a calibration to perform.



3 Set up the calibration. Make sure that all sensors are completely submerged or in the same calibration environment.



4 Wait for calibrations to complete. If one sensor isn't stabilizing, use the toggle switch to turn that sensor off and continue calibrating the others.



5 When all sensors have stabilized, tap **Accept**. Review the calibration report for the completed sensors.



6 Remove sensors and install them in the instruments they will be deployed in.

# VuSitu Mobile App

## VuSitu



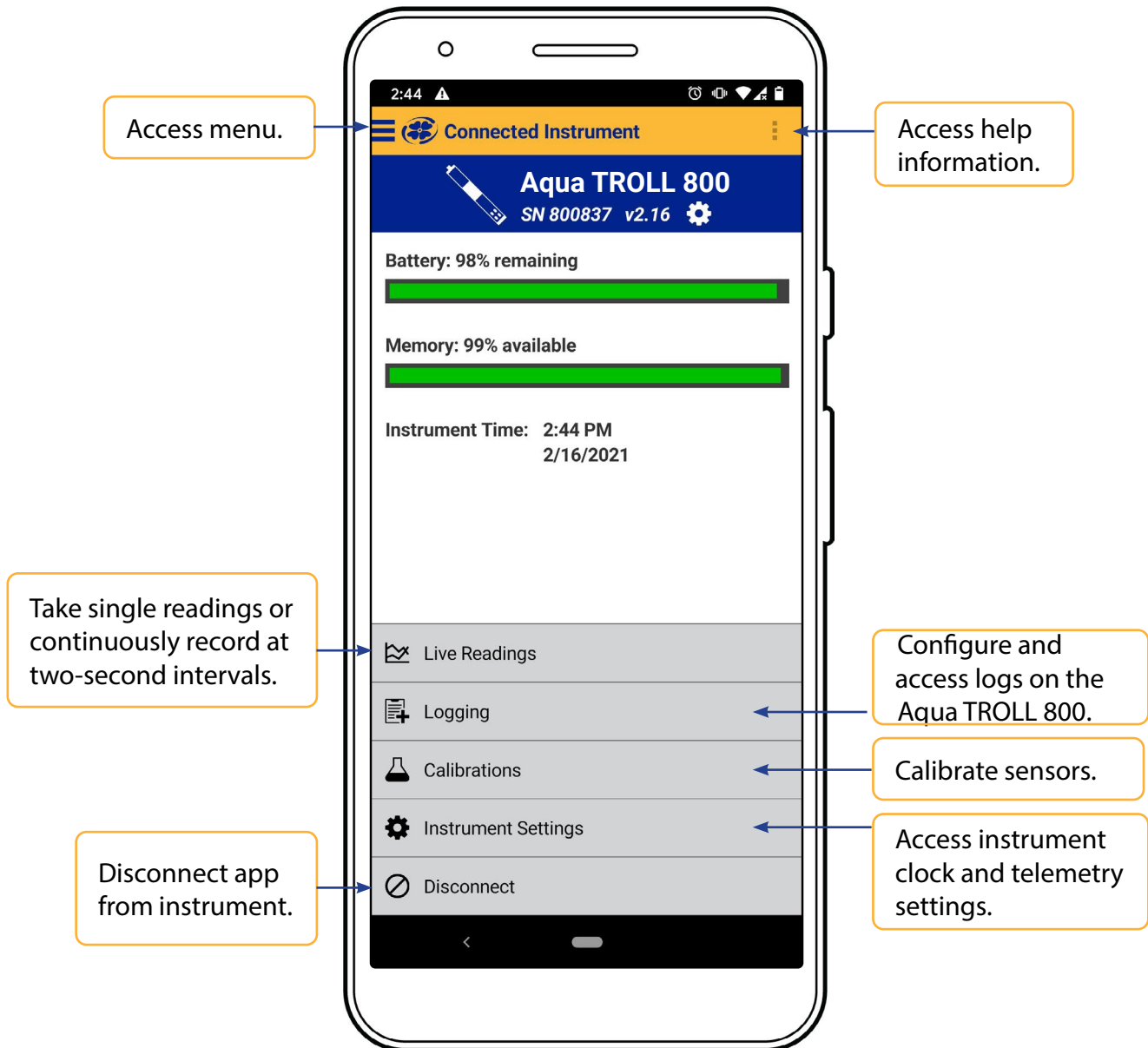
Use VuSitu to calibrate, configure, and deploy your Aqua TROLL 800. Download the app for free from the Google Play Store or the Apple App Store.

### Connecting with Bluetooth

The Aqua TROLL 800 can connect to a Bluetooth-enabled device for wireless communication with the VuSitu mobile app.

- If the Aqua TROLL 800 is connected to a Wireless TROLL Com, press the button on the Wireless TROLL Com. Then open VuSitu to connect.
- To connect to the Aqua TROLL 800 directly, turn on the Aqua TROLL 800 LCD screen by holding the sonde vertical with the sensor end facing up. Then open VuSitu to connect.

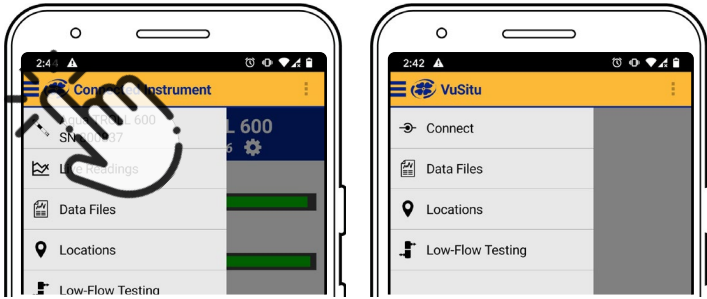
### Connected Instrument Screen



## VuSitu Menu Options



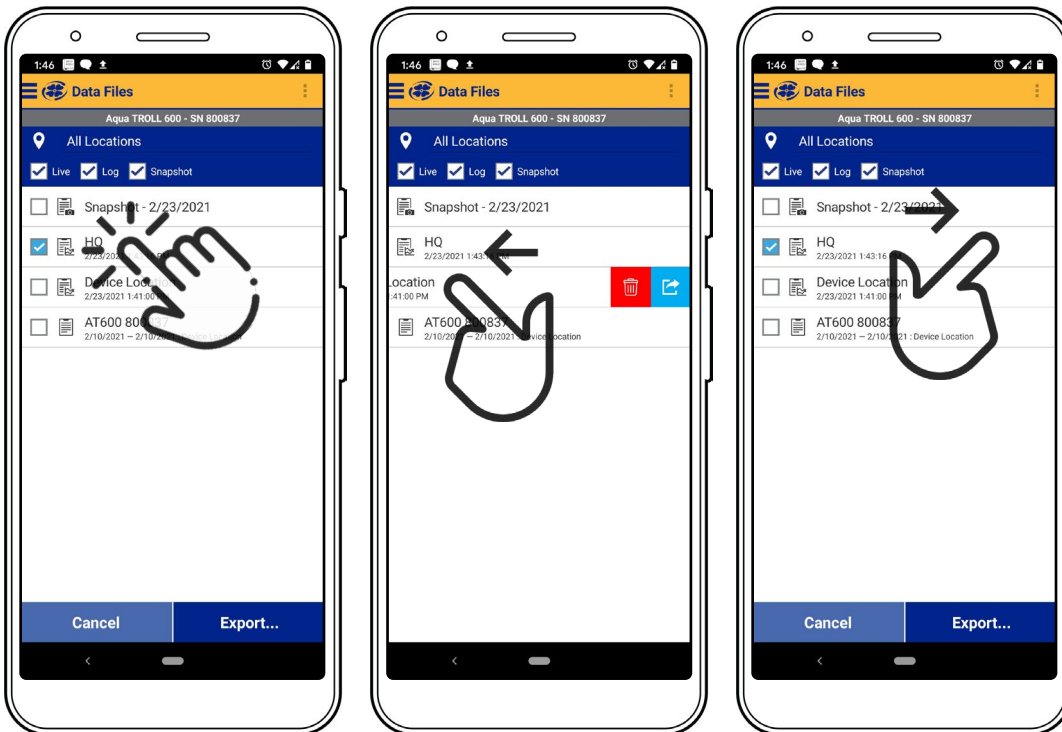
The features available in the VuSitu mobile app vary slightly depending on the instrument to which it is connected.



Tap the menu icon in the upper left portion of the screen to view options. Tap the icon again to close.

Some features aren't available when VuSitu isn't connected to an instrument.

## Selecting with Long-press and Swipe



Press and hold any item in a list of files. You can now select multiple files.

Press and swipe left to reveal the delete and share icons.

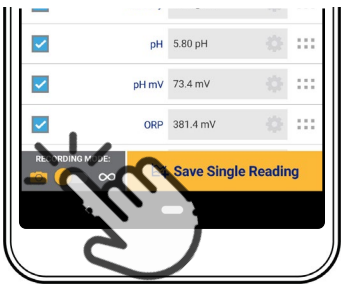
Press and swipe right to reveal the sharing icon.

# Live Readings in VuSitu

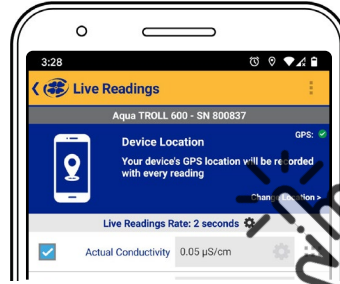


The live readings screen displays measurements taken from the instrument every two seconds. You can save these readings and share them via email or cloud storage.

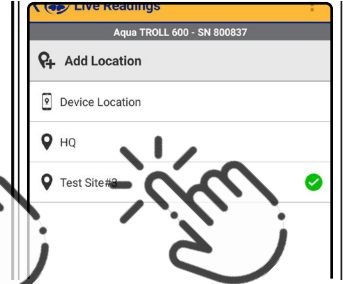
## Snapshot Mode



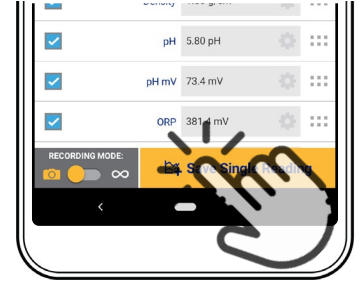
Tap the button on the bottom left to toggle between snapshot and live readings modes.



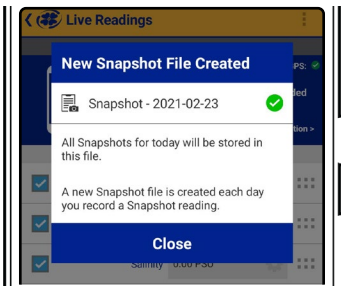
Tap **Change Location** in the top right corner if you wish to associate this data with a different location.



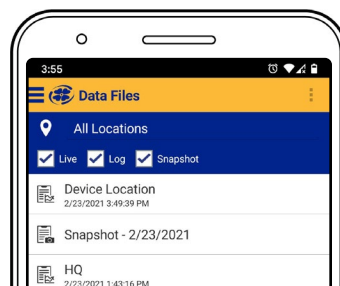
Choose the desired location and press **Save** in the bottom right corner of the screen.



Tap **Save Single Reading** to create a snapshot.

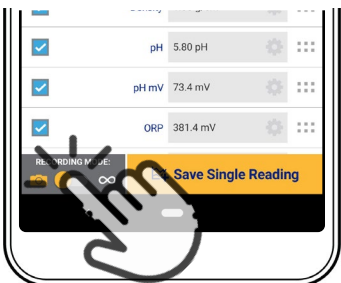


VuSitu confirms the new snapshot file.



View the file from the Data Files screen.

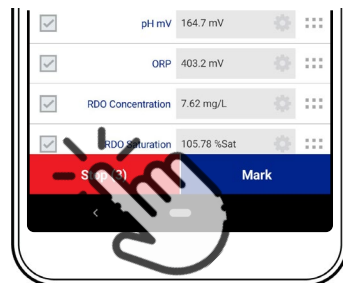
## Live Readings Mode



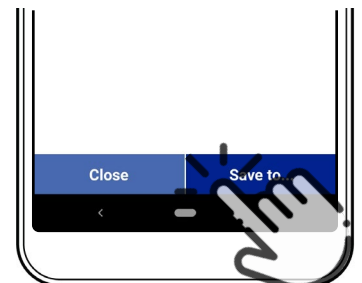
Tap the button on the bottom left to switch from snapshot mode to live readings mode.



Tap **Start Recording**. The instrument takes a reading every two seconds.



Tap **Stop** to end the recording. VuSitu displays a summary of the live readings data.



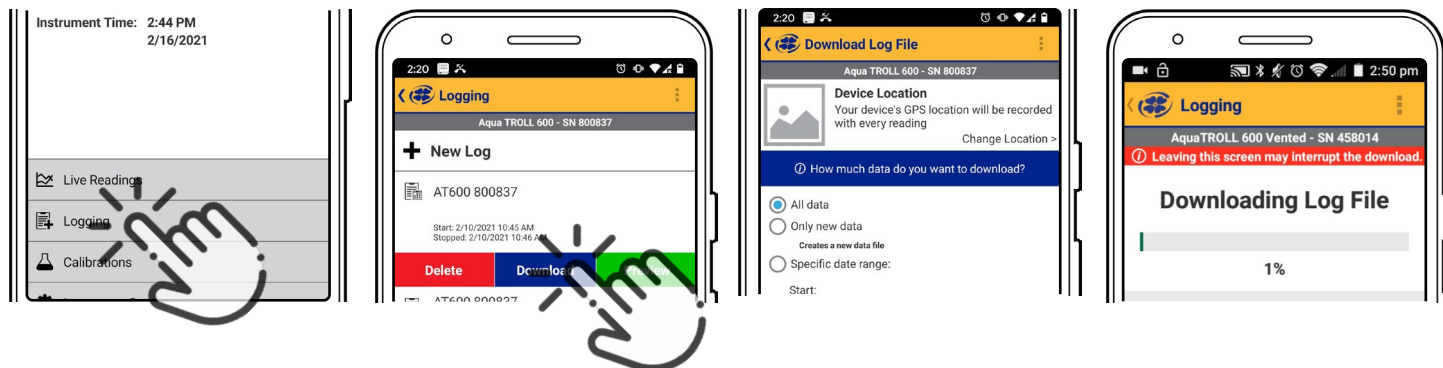
Tap **Save to** if you wish to share the Live Readings file via email or cloud storage.

# Viewing and Sharing Data

## Downloading Your Data



You can transfer a data file from your mobile device to a PC via Bluetooth, email it to yourself or any valid email address, or upload it to Google Drive.



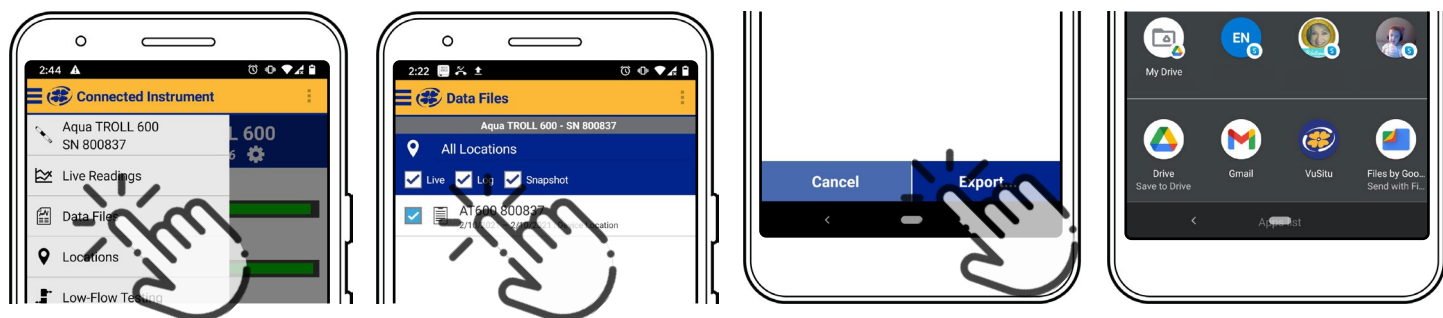
Pair VuSitu with the instrument. Select **Logging** from the Connected Instrument screen.

Tap a log and press the **Download** button.

Choose the data you wish to download. To save the entire log to your phone, choose **All data**.

VuSitu displays a progress bar while downloading.

## Sharing Data



Select **Data Files** from the menu at the top left corner of the screen.

Tap and hold the name of the log you want to share.

Select **Export**.

Choose email, cloud storage, or another sharing option.



To save data locally on your mobile device, export to a third-party file management app.

## Viewing Data on a Mac or PC



You'll need to extract your files to view them. To do that on a Mac, double-click the Zip folder. On a PC, right-click on the folder and choose **Extract**. Then open your files in Excel.

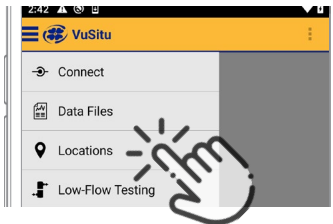


# VuSitu Locations

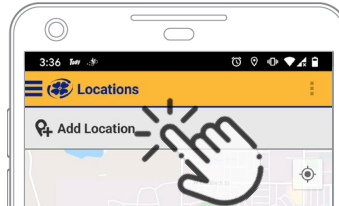
## About VuSitu Locations

A VuSitu location represents the physical spot where an instrument collects data. You can create a VuSitu location for any monitoring site. If you don't create a location, your data defaults to "Device Location." Location names appear on the live readings screen, in snapshot files, and in log files.

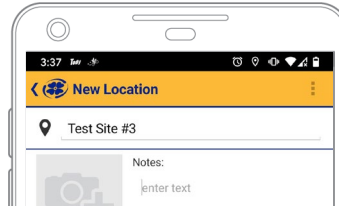
## How to Create a Location



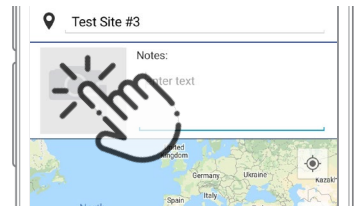
Select **Locations** from the main menu.



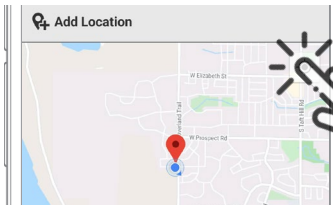
Tap **Add Location**.



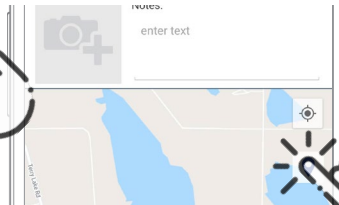
Enter a name for the location. You can also add notes.



If desired, tap the camera icon to take a photo of the new location.



To home in on your mobile device's current location, tap the button on the top right.

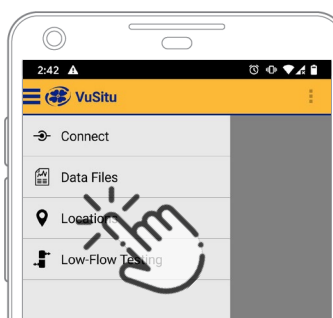


Tap the pin icon to establish the location on the map.

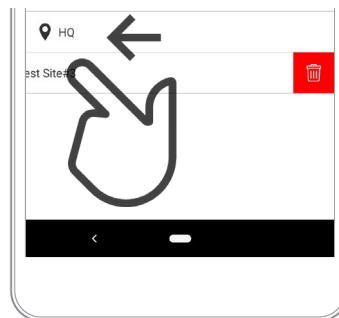


As an alternative, you can manually enter latitude and longitude values and tap **Apply**. Or, tap and hold a specific point on the map to drop a pin there.

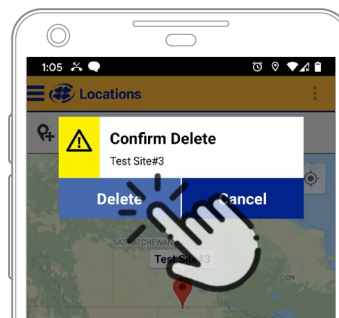
## How to Edit or Delete a Location



Select **Locations** from the app menu.



Tap the location you wish to delete and swipe left. Tap the trash icon.



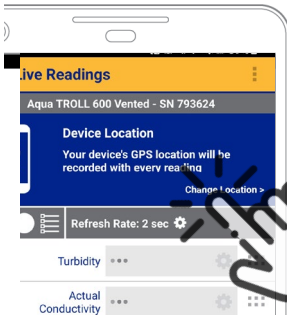
Confirm by tapping **Delete**.



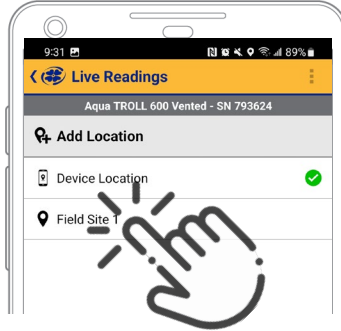
## How to Select a Location



Data is associated with the Location that is displayed on the Live readings screen. You can change the location for your data from the Live Readings screen.



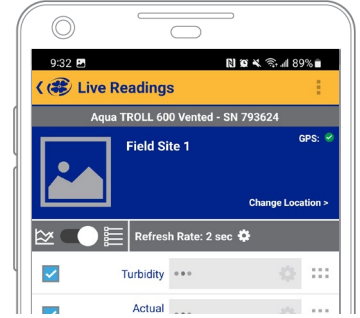
Tap **Change Location** on the live readings screen.



Tap a location to select it, or add a new Location.



Tap **Save**.



New live readings data will be associated with this location.

## Instrument Bluetooth

### Disabling Instrument Bluetooth



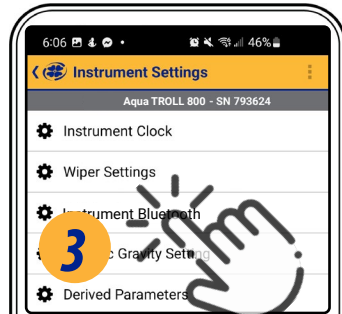
You can use Instrument Bluetooth to connect directly to the Aqua TROLL without a communication device. Instrument Bluetooth is enabled by default on your Aqua TROLL 800. If you need to disable Instrument Bluetooth, follow the steps below.



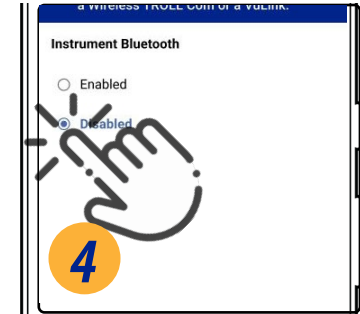
Connect to VuSitu using a Wireless TROLL Com or a VuLink.



Select **Instrument Settings**.



Select **Instrument Bluetooth**.



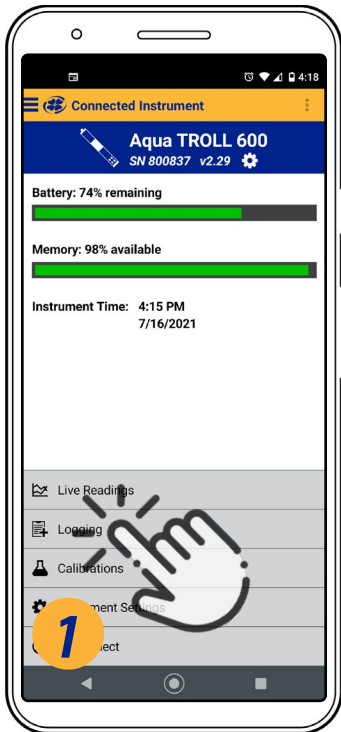
Choose **Disabled**, then save your selection.

# Logging

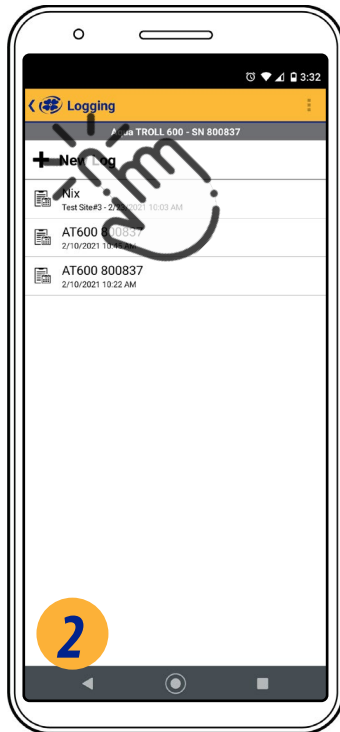
## Creating a Log with VuSitu



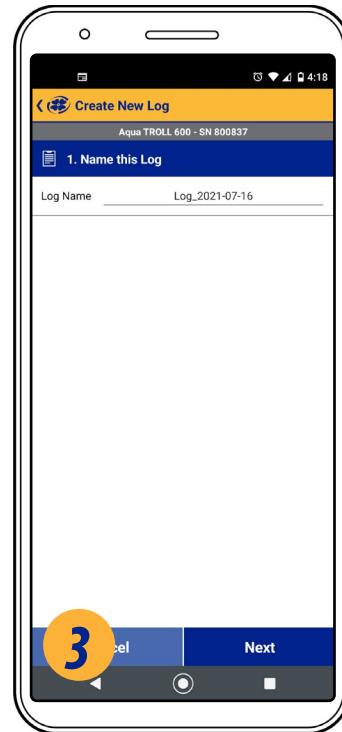
Connect to the instrument via VuSitu to create a log. Then follow the on-screen instructions. You can schedule a start time for the log or start the log immediately.



Select **Logging**.



Tap **New Log**.



Follow the on-screen instructions to create and schedule a log.



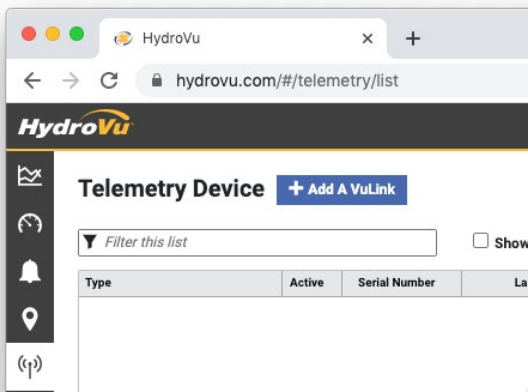
For non-vented instruments, program a VuLink log with barometric compensation enabled. View the compensated data in HydroVu or download the log from the VuLink. See the Remote Monitoring section of this manual for more information.

# Remote Monitoring with VuLink



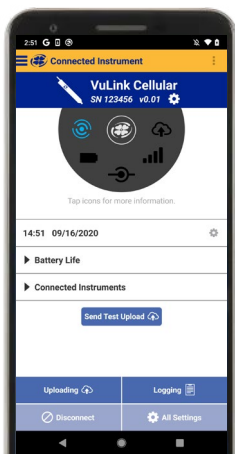
Using VuLink in any manner not specified by the manufacturer may impair the device's built-in protections. For complete information on remote monitoring, refer to the VuLink manual at [www.in-situ.com](http://www.in-situ.com)

## 1 Claim VuLink.



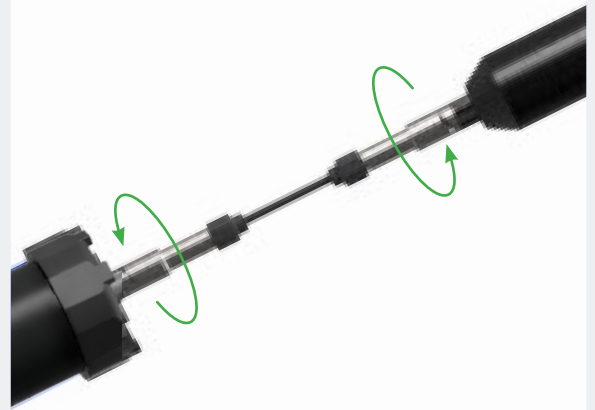
Log into your HydroVu account and claim VuLink from the Telemetry page.

## 3 Configure and deploy.



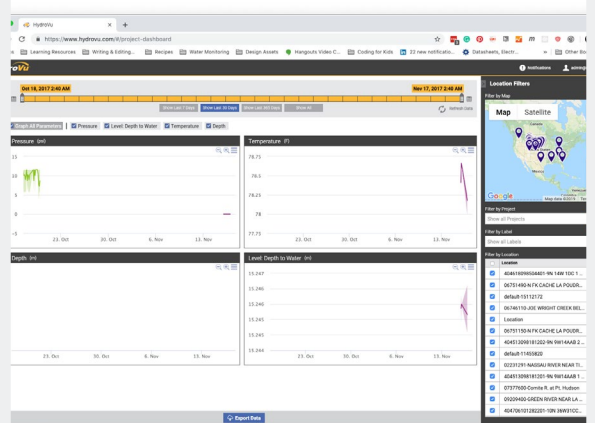
Create a log and adjust instrument settings with the VuSitu mobile app. Then deploy the instrument.

## 2 Connect the instrument.



Connect the Aqua TROLL instrument to VuLink with a Rugged Twist-Lock Cable.

## 4 View data in HydroVu.



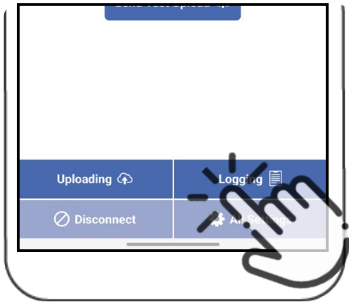
See graphs of your data and make changes to VuLink in HydroVu.



# Barometric Compensation of Non-Vented Instruments

Non-vented instruments log absolute pressure readings by default. You can use the built-in barometer in a VuLink to automatically compensate the pressure and level readings. To turn on barometric compensation with a VuLink, follow the steps below. To turn off barometric compensation, factory reset the Aqua TROLL.

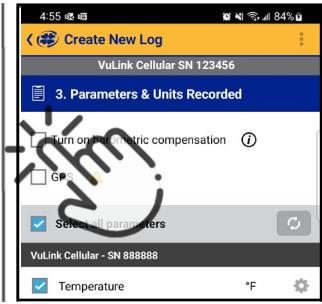
## 1 Configure the VuLink Log



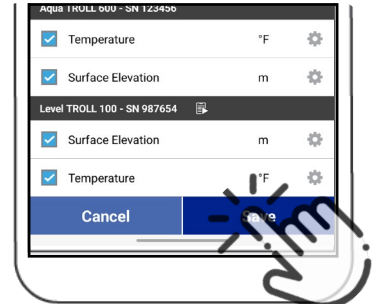
Open VuSitu and connect to the VuLink. Tap **Logging**.



Tap **New Log**.

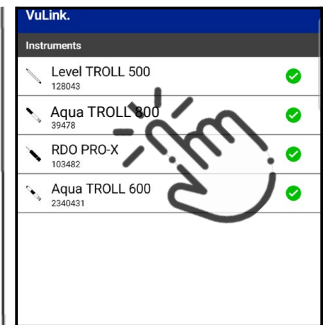


Configure the VuLink Log. Check **Turn on Barometric Compensation** when prompted.



**Save** the VuLink Log.

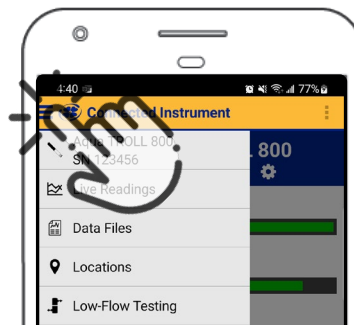
## 2 Configure the Instrument Log



Select your Aqua TROLL 800 under **Connected Instruments**.



Follow the instructions in the Logging section of this manual to create a log on the Aqua TROLL.



Use the menu to return to the VuLink if you need to configure additional settings.

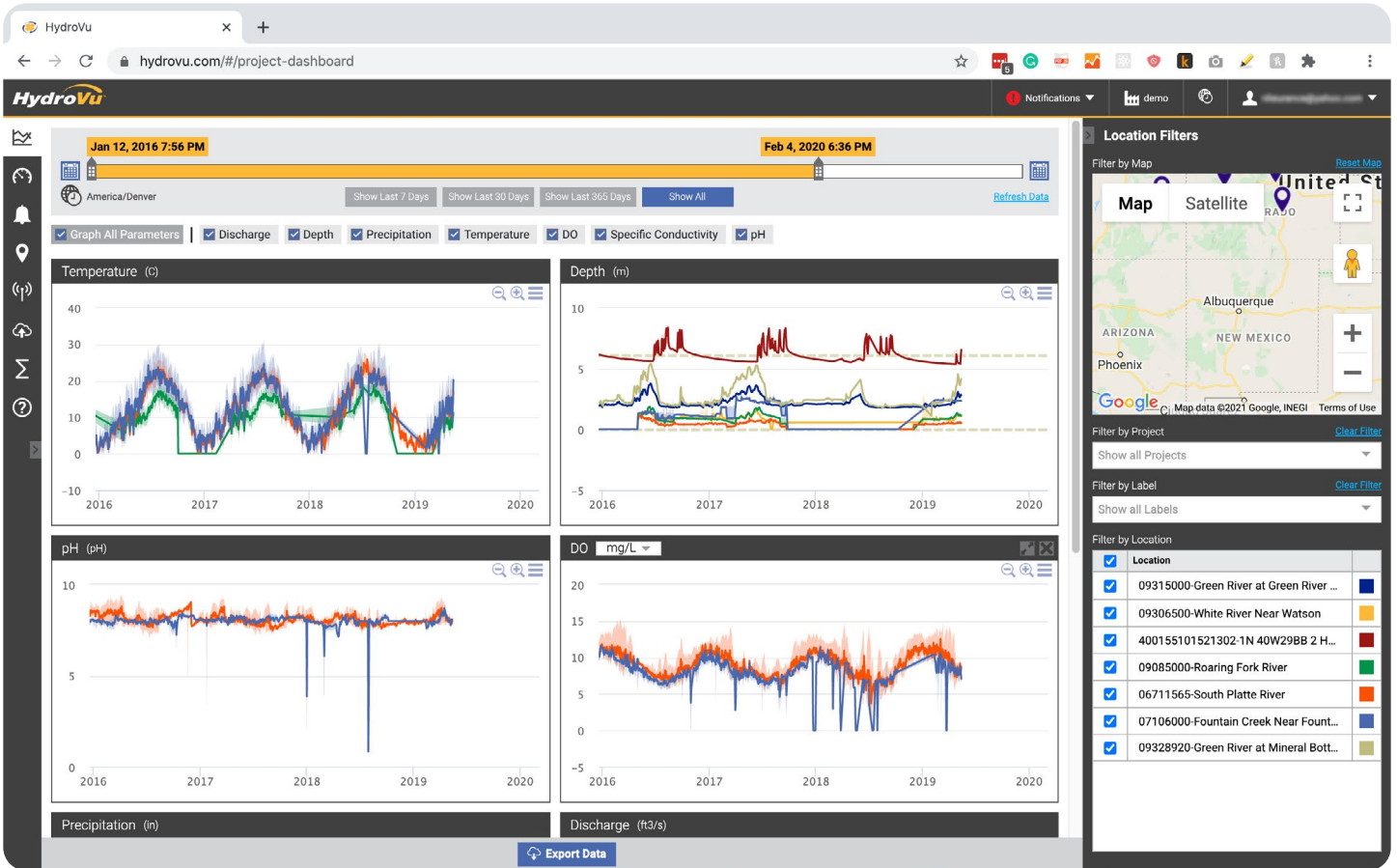


For the most accurate readings on the Aqua TROLL log, use a similar start time and reading rate for both logs. The VuLink log will collect a new barometric pressure value with every reading. The Aqua TROLL Log will use the most recent barometric pressure provided by the VuLink.

# HydroVu



HydroVu is a data-management application that runs in the browser. Use it to manage data, view graphs, and configure telemetry devices for remote monitoring. See it at [www.hydrovu.com](http://www.hydrovu.com).

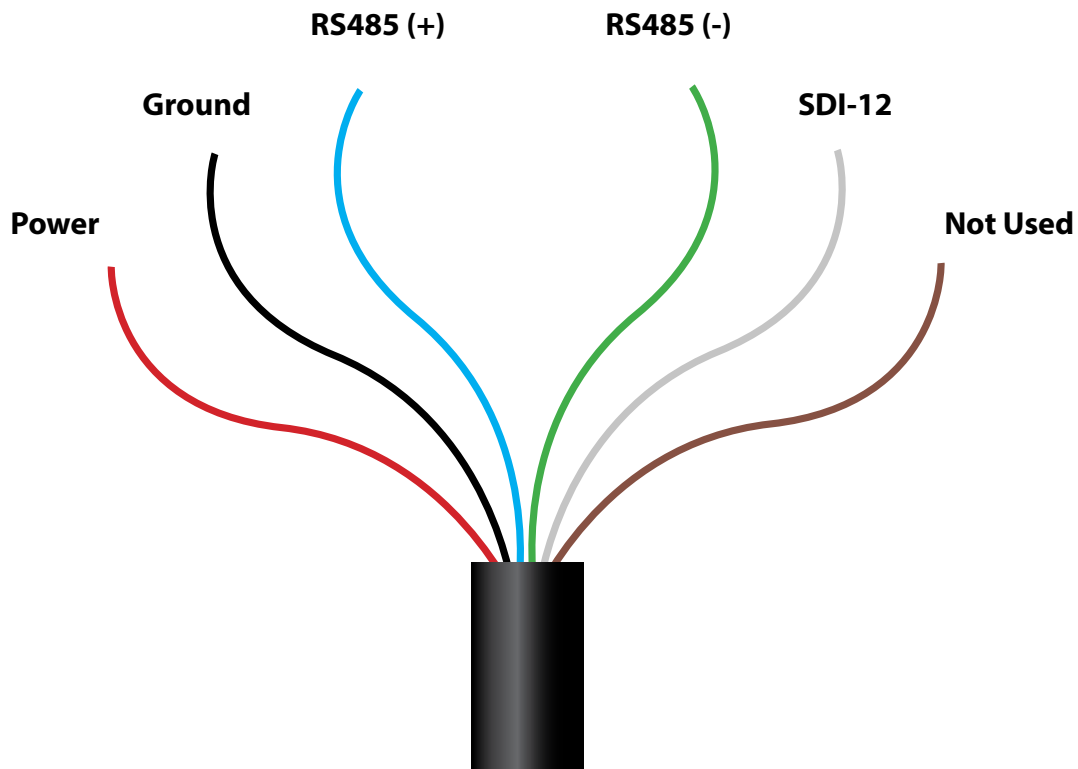


# Connecting the Aqua TROLL 800 to a PLC or Data Logger

## Flying Leads Wire Diagram



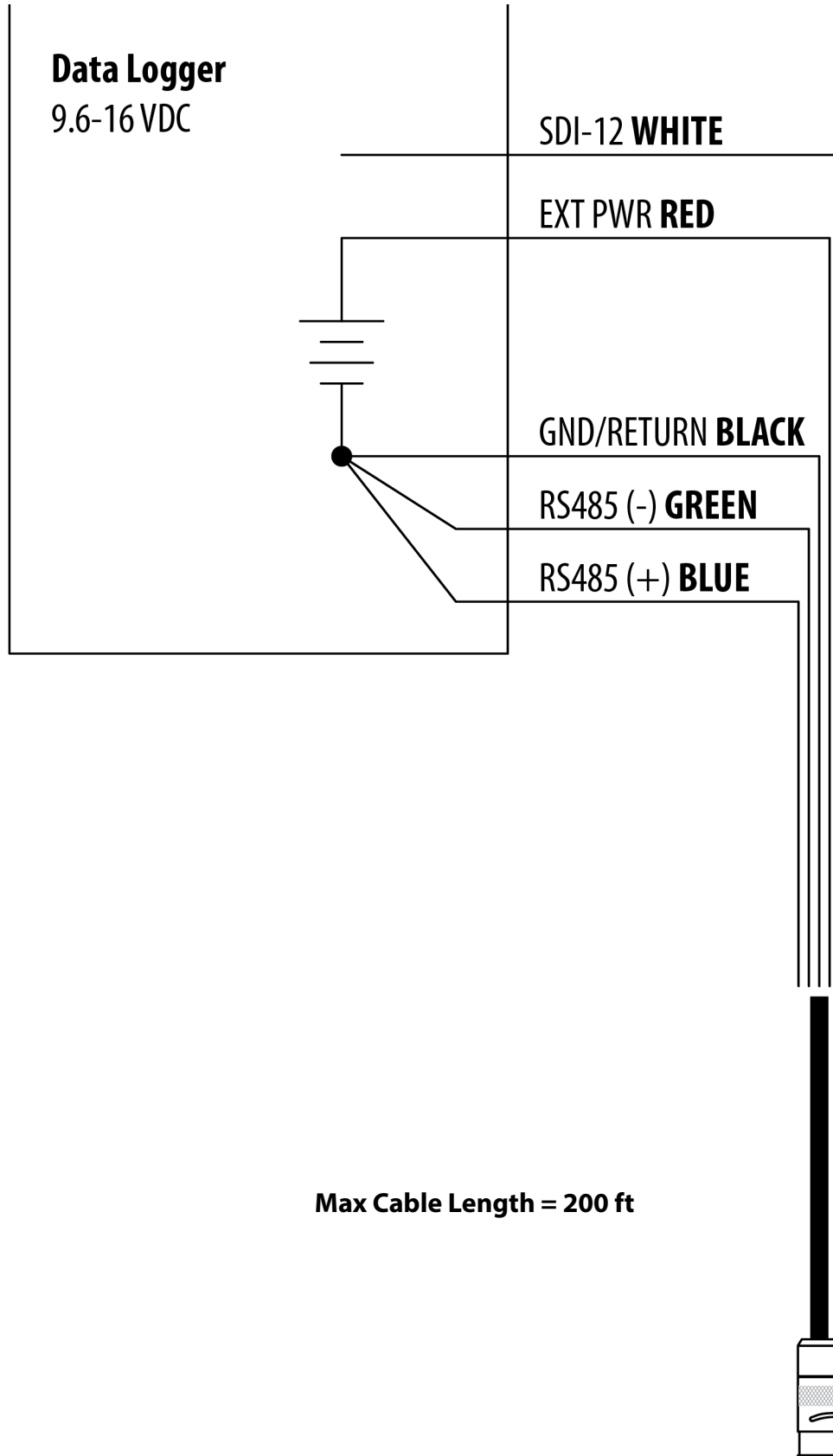
Refer to the diagrams on the following pages for PLC wiring diagrams. Unused leads should not be touching.



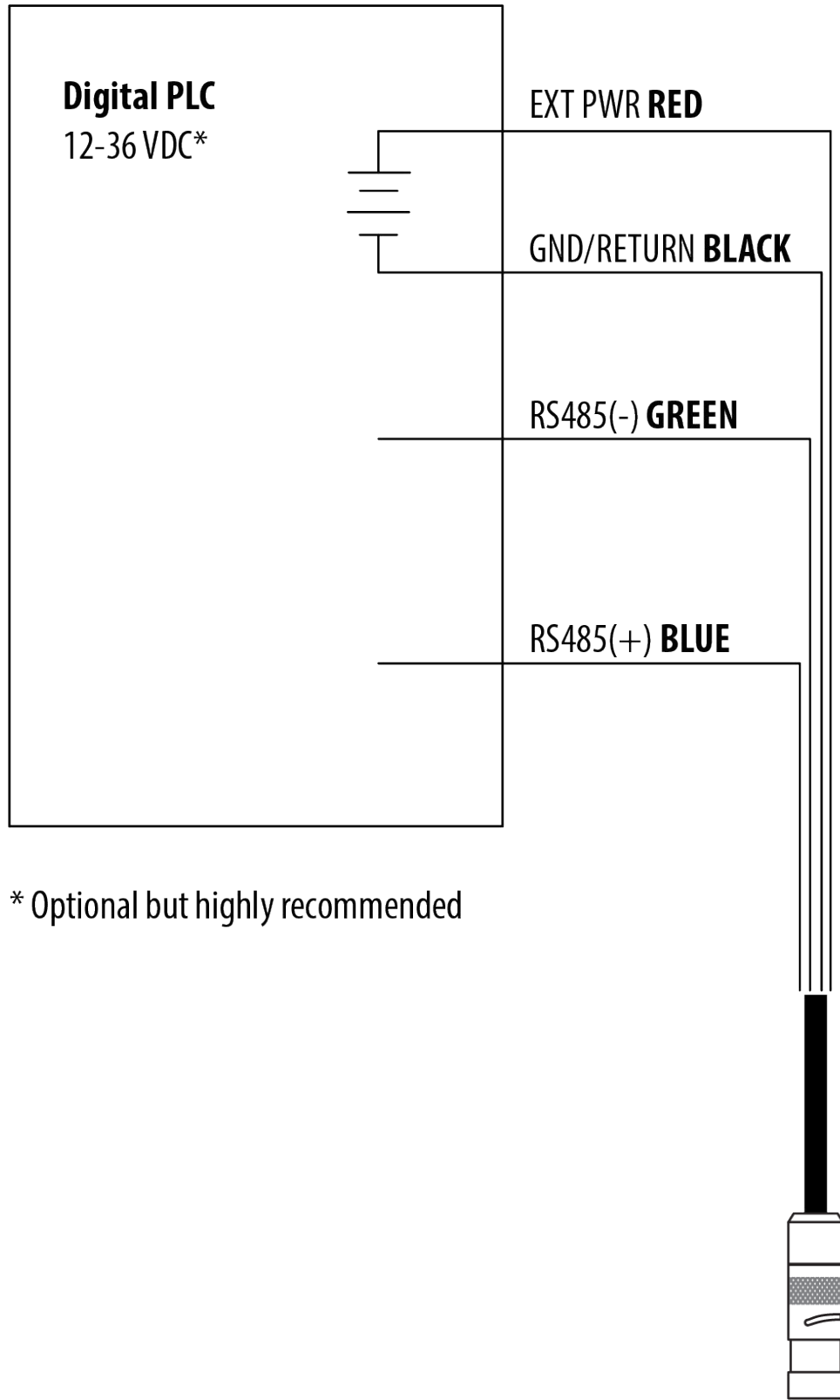
**Flying Leads Cable Wire Legend**

| Wire Color | Signal         |
|------------|----------------|
| Red        | External Power |
| Black      | Ground         |
| Blue       | RS485 (+)      |
| Green      | RS485 (-)      |
| White      | SDI-12         |
| Brown      | Not Used       |

**SDI-12 3 Wire**

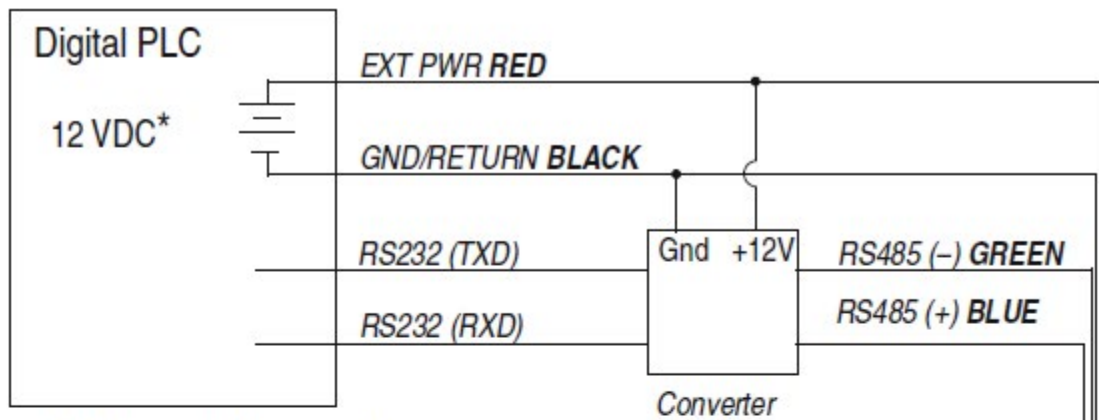


# Modbus Master RS485

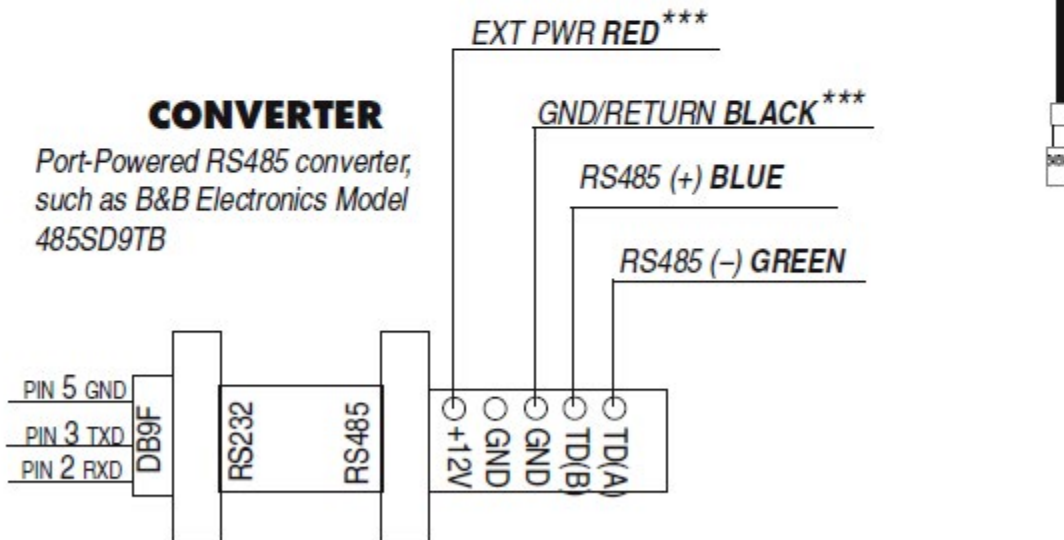




## Modbus Master with RS232 (Converter Required)



\* Voltage limited by converter



\*\*\*Required if port power is not available

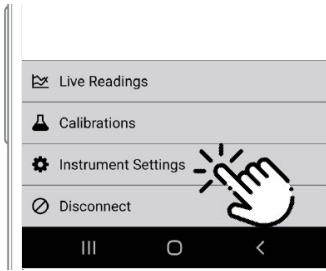
# Configuring SDI-12 Settings

## About SDI-12

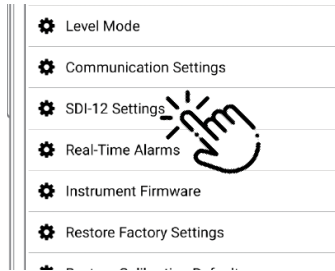
You can configure the list of SDI-12 parameters in VuSitu under **Instrument Settings**.

The Aqua TROLL 800 conforms to the general SDI-12 Standard Version 1.3. For more information about SDI-12 commands, see the SDI-12 Standard Version 1.3 document from the SDI-12 Support Group Technical Committee.

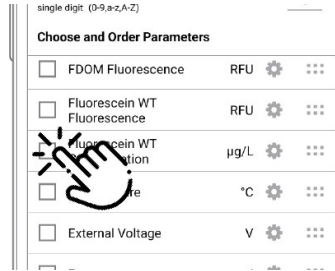
## Configure SDI-12 Settings in VuSitu



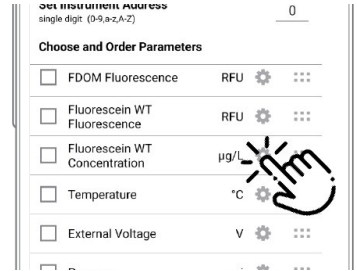
Connect to VuSitu and select **Instrument Settings**.



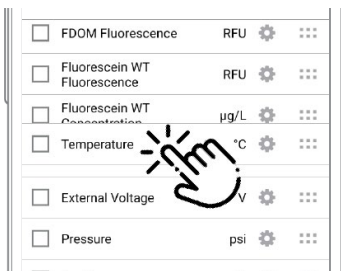
Choose **SDI-12 Settings**.



Use the checkboxes to select parameters to display.



Tap the gear icon to adjust the units for each parameter.



Drag and drop parameters to change the order.

# Modbus PLC Interface

## Overview

The Modbus PLC Interface is a simplified method of communicating with the Aqua TROLL 800 using the Modbus protocol. It reduces programming complexity and allows the user to remove sensors and reinstall them in different ports. Please note the following limitations when using this interface:

- Only one sensor of any sensor model can be used in the sonde (for example: only one turbidity sensor can be installed).
- If a parameter is provided by more than one of the installed sensors, the interface will return the most accurate value available.

For information about the specific Modbus registers and Unit IDs for your Aqua TROLL 800, see Appendices A and B. The Aqua TROLL 800 conforms to the Modbus standard. For more information about Modbus communication, see [www.modbus.org](http://www.modbus.org).

## Setting Up Instrument

1. Install the sensors, connect power, and turn on the display by holding the instrument vertically.
  - a. Ensure the display turns on and check the LCD to ensure the sensors are working.
2. The setup below is using the instrument's factory default settings. Use VuSitu to reset the instrument to factory defaults if they have been changed. Take note of any changes in default units setup.

## Programming the PLC

1. Set up the serial communication to match the instrument communication settings. Communication settings can be changed with the VuSitu mobile app. The default communication settings are:

| Mode | Start Bit | Baud Rate | Data Bits | Parity | Stop Bit |
|------|-----------|-----------|-----------|--------|----------|
| RTU  | 1         | 19200     | 8         | Even   | 1        |

2. Set the device address match the instrument address. The default device address is 1.
3. Set the PLC to wake-up the device by sending a carriage return (0x0D) or any Modbus command.
  - a. Allow one second before sending a second command. The instrument needs this time to wake up.
  - b. After the wake-up command, the next reading must be taken before the end of session timeout. If the reading interval exceeds the end of session timeout, send a new wake-up command before requesting a new reading. The default end of session timeout is 5 seconds, and may be longer if the instrument has been connected to VuSitu.
4. If you have changed or moved the sensors since the device was last connected, read holding register 6948 to trigger the instrument to scan the sensors. The return value can be discarded.
  - a. Each register is a holding register. Some PLCs require you to add 40000 to the register number or address. For example: 6948 would be 46948.
  - b. Alternatively, you can prompt the instrument to discover its sensor mapping by connecting it to the VuSitu mobile app.
5. Select the register to read on the PLC using the information in the following sections.
  - a. Some PLC devices use the register number directly in programming statements, others use register addresses, which are one less than the register number. Refer to PLC manufacturer instructions to determine which programming style to use.
  - b. Each register is a holding register. Some PLCs require you to add 40000 to the register number or address. For example: 5451 would be 45451.
6. Set the type of register to: 32-bit float
  - a. If asked by the PLC this is 2 registers
7. Set the byte order to: Big Endian (MSB)
  - a. This should be the default and may not be configurable on all PLCs

## Reading Device Information

Use the following registers to read general information about the instrument.

| Holding Register Number | Holding Register Address | Size (Registers) | Data Type | Description  |
|-------------------------|--------------------------|------------------|-----------|--|
| 9001                    | 9000                     | 1                | uint16    | Device Id:<br>40 = Aqua TROLL 800 Non-vented<br>41 = Aqua TROLL 800 Vented |
| 9002                    | 9001                     | 2                | uint32    | Serial Number  |
| 9007                    | 9006                     | 1                | uint16    | Firmware version (100 = 1.00)  |

## Reading Parameters

Each parameter contains a block of 7 registers as shown in the table below. To read measurements for a specific parameter, look up the starting register for that parameter from the list of Parameter Numbers and Locations in Appendix A. Once you have the starting register, add the number of offset registers for additional information about the reading.

| Register Offset | Size (Registers) | Mode (R/W) | Data Type | Description   |
|-----------------|------------------|------------|-----------|---|
| 0               | 2                | R          | float     | The measured value from sensor  |
| 2               | 1                | R          | uint16    | Data Quality ID:<br>0 = No errors or warnings<br>3 = Error reading parameter<br>5 = RDO Cap expired<br>For additional errors or information, contact technical support. |
| 3               | 1                | R/W        | uint16    | Units ID for this parameter. See: Appendix B.   |
| 4               | 1                | R          | uint16    | Parameter ID for this parameter. See: Appendix A.   |
| 5               | 2                | R/W        | float     | Off line sentinel value: The value that's returned on error or if the parameter isn't available. The default sentinel is 0.0  |

For example, you can apply this information to collect a reading for Actual Conductivity.

From the list in Appendix A, you can find that the starting register for Actual Conductivity is 5507. A reading from register number 5507 (register address 5506) will return the measured value of Actual Conductivity.

Some PLC devices use the register number directly in programming statements, others use register addresses. Refer to PLC manufacturer instructions to determine which programming style to use.

You can use the register offsets listed in the table above to collect additional information about the reading. Adding the register offset of 2 to the starting register, you can find that register number 5509 (register address 5508) will return the Data Quality ID for the most recent Actual Conductivity measurement. Likewise, register number 5510 (register address 5509) will return the Units ID, which can be interpreted from Appendix B. Register number 5511 (register address 5510) will return the Parameter ID, which can be interpreted from Appendix A. Register number 5512 (register address 5511) will return the sentinel value.

The Units ID and Sentinel Value are writeable registers. Measurements can be changed to other units using the Units ID as shown in Appendix B. For example, if register number 5510 (Actual Conductivity Units ID) returns 65, Actual Conductivity is configured to report in  $\mu\text{S}/\text{cm}$ . Looking at Appendix B, you can find that  $\text{mS}/\text{cm}$  is also a valid unit which can be set by writing Units ID 66 to register number 5510.

## Turning on Instrument Bluetooth with a PLC

Use the VuSitu mobile app to configure, calibrate, and troubleshoot the instrument. Wait 1 minute after the last command before connecting to VuSitu. To enable Bluetooth without a communication device:

1. Stop sending logging or data commands from the PLC or data logger.
2. Write "1" to register number 9211 (register address 9210) to enable Instrument Bluetooth.
3. Set the instrument on a flat surface and stop sending commands for 1 minute.
4. Turn instrument vertical to activate the changes, then connect to VuSitu.

# Care and Maintenance

## Storage

### Short-term (less than one week)



Remove the restrictor and the end cap.



Put the restrictor on the instrument in calibration mode.



Pour 15 mL (0.5 oz) of clean water into the restrictor.



Thread the cap onto the sonde and store.

### Long-term (more than one week)



Remove pH/ORP sensor and any ISE sensors.



Dampen the sponge inside the pH/ISE sensor storage caps with Storage Solution or pH 4 calibration standard.



Replace the caps at both ends of the sensor. Use electrical tape to seal the storage cap.



Thread the restrictor onto the sonde.



Store the sonde between  $-40$  and  $65^{\circ}$  C. See the Instrument Specifications section for additional storage temperature requirements for pH/ORP and ISE sensors.

## Cleaning the Sonde

Rinse the sonde thoroughly. Clean with warm water and mild soap, then rinse the sonde again. Allow to air dry.



Prevent water from entering the cable connector.

## Removing the Restrictor

If the restrictor or end cap are stuck and difficult to remove by hand, use strap wrenches to provide extra leverage. Remove the end cap bumper before using strap wrenches.



Never use pipe wrenches or a vise grip which may damage the instrument. Never insert tools into the restrictor holes for leverage, as they may damage the wiper shaft or sensors. Strap wrenches should only be used when necessary to remove or loosen parts. Tighten parts by hand only.

## Maintenance Schedule



For best results, send the instrument and sensors for factory maintenance and calibration every 12 to 18 months.

## User-Serviceable Parts



### O-rings

Lubricate O-rings during initial setup. Check and replace O-rings if worn, damaged, or discolored.



### Wiper Brush

Replace brush according to site needs when bristles are visibly bent, damaged, or fouled.



### Desiccant Capsule

Replace the desiccant capsule when the desiccant turns pink.



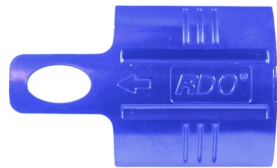
### Bumpers

Replace bumpers and collar when they are visibly worn or damaged.



### Sensors

See each sensor instruction sheets for details about maintaining and replacing each sensor.



### RDO Sensor Cap

Refer to the sensor cap instruction sheet for details.



### Sensor Fill Solution

Refer to the instructions for the pH/ORP sensor and ISE sensors like Nitrate, Ammonium, and Chloride for details.



### Reference Junction

Refer to the instructions for the pH/ORP sensor and ISE sensors like Nitrate, Ammonium, and Chloride for details.

## Wiper Maintenance



Replace brush according to site needs when bristles are visibly bent, damaged, or fouled.

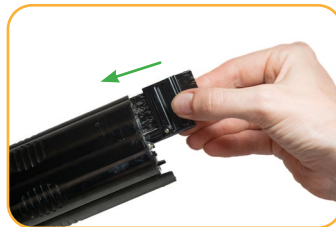
### Replace wiper brush.



Loosen brush housing with hex key.



Slide the old brush off of the wiper shaft.



Slide the new brush onto the wiper shaft.



Tighten brush screw with hex key.



## Replacing Desiccant

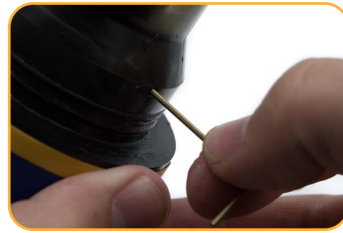
A replaceable desiccant capsule prevents moisture from damaging the instrument and batteries. Check the capsule periodically. A pink color indicates expired/exhausted desiccant.



Remove the battery cover.



Remove the wrench from the back of the battery compartment.



Use the wrench to push the desiccant capsule out of the hole in the back of the battery compartment.



Insert a new capsule. Replace the wrench and battery cover.

## Replacing O-Rings



Replace O-rings when performing routine maintenance. Refer to the diagram below for the location of each O-ring. Apply a thin layer of grease to each O-ring after installing.



1. Twist-Lock O-Ring
2. Battery Cover Connector O-Rings
3. Battery Cover O-Rings
4. Restrictor Seal O-Rings
5. Sensor Block O-Ring
6. Sensor Connector O-Rings
7. RDO® Cap O-Rings (RDO sensor only)



Never use metal objects to remove O-rings. They can scratch the plastic and compromise the quality of the seal. If necessary, wood or plastic tools may be used to gently remove O-rings.

# Cleaning and Storing the pH/ORP Sensor and Ion-Selective Electrode (ISE) sensors

## Storage



Dampen the sponge inside the sensor storage cap with Storage Solution or pH 4 calibration standard.



Replace the caps at both ends of the sensor. Use electrical tape to seal the storage cap.



Do not store the pH/ORP sensor or ISE sensors in DI water. It will deplete the reference solution and drastically reduce the life of the sensor.

## Routine Maintenance

If the ORP platinum electrode is dull or dirty, it can be cleaned with a swab and methanol or isopropyl alcohol. Rub the electrode gently until it is shiny. The pH sensor must be kept moist for the life of the sensor. The sensor fill solution has a shelf life of 2 years. Replace the fill solution every 5 to 6 months or when:

1. The sensor fails to calibrate within the acceptable slope and offset range.
2. Sensor readings vary or are slow to respond.
3. Readings during calibration at pH 7 are greater than +30 mV or less than -30 mV.

## Replacing the Filling Solution



Remove sensor from sonde and unscrew reference junction.



Discard old solution onto a paper towel and throw it in the trash. Do not discard down the drain.



Insert tube from filling solution bottle into sensor.



Squeeze solution into reservoir until full. Slowly remove tube.



Reinstall reference junction. Dry sensor body.



Soak ISE sensors for 2 hours in the highest concentration calibration standard you plan to use.



Rinse the sensor thoroughly prior to calibration.



## Replacing the Junction



If the sensor fails to calibrate after you replace the fill solution, replace the reference junction.



Remove sensor from sonde and unscrew reference junction.



Discard old solution onto a paper towel and throw it in the trash. Do not discard down the drain.



Insert tube from filling solution bottle into sensor.



Squeeze solution into reservoir until full. Slowly remove tube.



Reinstall reference junction and wipe sensor body dry.



Soak ISE sensors for 2 hours in the highest concentration calibration standard you plan to use.



Rinse the sensor thoroughly prior to calibration.



Keep the reference junction damp at all times.

## Cleaning

Begin with the gentlest cleaning method and continue to the others only if necessary. Do not directly wipe the glass bulb. To clean the pH sensor, gently rinse with cold water. If further cleaning is required, consider the nature of the debris.

To remove crystalline deposits:

1. Clean the sensor with warm water and mild soap.
2. Soak the sensor in 5% HCl solution for 10 to 30 minutes.
3. If deposits persist, alternate soaking in 5% HCl and 5% NaOH solutions.

To remove oily or greasy residue:

1. Clean the sensor with warm water and mild soap.
2. Methanol or isopropyl alcohol may be used for short soaking periods, up to 1 hour.
3. Do not soak the sensor in strong solvents, such as chlorinated solvents, ethers, or ketones, such as acetone.

To remove protein-like material, or slimy film:

1. Clean the sensor with warm water and mild soap.
2. Soak the sensor in 0.1 M HCl solution for 10 minutes and then rinse with deionized water.

## ***Cleaning and Storing the RDO Sensor***

### **Routine Maintenance**

1. Leave the sensor cap on.
2. Rinse the sensor with clean water.
3. Gently wipe with a soft cloth or brush if biofouling is present.
4. If extensive fouling or mineral buildup is present, soak the sensor in vinegar for 15 minutes, then soak in deionized water for 15 minutes.



Do not use organic solvents—they will damage the sensor cap. Do not remove the sensor cap when rinsing or brushing.

5. After cleaning the sensor, perform a 100% Saturation Calibration.

### **Cleaning the Optical Window**

Clean the optical window only when changing the sensor cap.

1. Remove the cap.
2. Gently wipe the sensing window with the supplied lens cloth.



Do not wet the lens with any liquid.

### **Storage**

Prior to installation, store the sensor body and cap in the factory supplied containers.

Once installed on the sonde, the RDO sensor can be stored wet or dry depending on the sensor configuration of the sonde.



Never store the RDO sensor without the sensor cap once it has been installed on the sonde.

## ***Cleaning and Storing the Turbidity Sensor***

### **Routine Maintenance**

The optical windows should be clear of foreign material. To clear material gently rub the sensing windows using clean water and a soft cloth or swab. Do not use solvents on the sensor.

### **Storage**

Prior to installation, store the sensor in the factory supplied container. Once installed on the sonde, the turbidity sensor can be stored wet or dry depending on the sensor configuration of the sonde.

## ***Cleaning and Storing the Conductivity Sensor***



Soaking the sensor in vinegar for longer than one hour can cause serious damage.

Begin with the most gentle cleaning method and continue to the other methods only if necessary. To clean the conductivity sensor face, gently rinse with clean, cold water. If further cleaning is required, consider the nature of the debris.

To remove crystalline deposits:

1. Clean the sensor face with warm water and mild soap.
2. Use a soft brush to gently clean the sensor pins and temperature button. Ensure removal of all debris around the base of the pins and button.
3. If crystalline deposits persist, soak in 5% HCl for 10 to 30 minutes followed by warm soapy water and soft brushing.
4. If deposits persist, alternate soaking in 5% HCl and 5% NaOH solutions followed by warm soapy water and soft brushing.

To remove oily or greasy residue:

1. Clean the sensor face with warm water and mild soap.
2. Using a soft brush, gently clean the sensor pins and temperature button. Ensure removal of all residue around the base of the pins and temperature button.
3. Isopropyl alcohol may be used for short soaking periods, up to one hour.
4. Do not soak in strong solvents such as chlorinated solvents, ethers or ketones (such as acetone).

To remove protein-like material, or slimy film:

1. Clean the sensor face with warm water and mild soap.
2. Using a soft brush, gently clean the sensor pins and temperature button. Ensure removal of all material/film around the base of the pins and temperature button.
3. Soak the sensor in 0.10% HCl for 10 minutes and then rinse thoroughly with distilled water.

### **Storage**

Prior to installation, store the sensor in the factory supplied container.

Once installed on the sonde, the Temperature Sensor and Conductivity Sensor can be stored wet or dry depending on the sensor configuration of the sonde.

## ***Cleaning the Copper Antifouling Restrictor***

When copper is deployed in environmental waters, particularly marine environments, the copper will oxidize and develop a patina, which may affect optical sensor readings. Avoid soaking the restrictor in solvents or acids so that the natural patina is preserved and calibrations are representative of field conditions.

1. Remove the restrictor from the sonde.
2. Remove the restrictor end cap.
3. Gently remove biofilm with a cloth or soft bristle brush, mild soap, and warm water.
4. Rinse the restrictor in water and air dry.

## *Service and Repair*

### ***Obtaining Repair Service***

If you suspect your system is malfunctioning and repair is needed, you can help assure efficient servicing by following these guidelines:

1. Call or email In-Situ Technical Support. Have the product model and serial number available.
2. Be prepared to describe the problem, including how the product was used and the conditions noted at the time of the malfunction.
3. If Technical Support determines that service is needed, they will ask your company to fill out the RMA form and pre-approve a specified monetary amount for repair charges. When the form and pre-approval is received, Technical Support will assign an RMA (Return Material Authorization) number.
4. Clean the product as described in the manual.
5. If the product contains a removable battery, remove and retain it unless you are returning the system for a refund or Technical Support states otherwise.
6. Carefully pack your product in its original shipping box, if possible.
7. Mark the RMA number clearly on the outside of the box.
8. Send the package, shipping prepaid, to:

In-Situ:

ATTN: Repairs

221 East Lincoln Avenue

Fort Collins, CO 80524

The warranty does not cover damage during transit. In-Situ recommends insurance for all shipments. Warranty repairs will be shipped back prepaid.

### **Outside the U.S.**

Contact your international In-Situ distributor for repair and service information.

## Guidelines for Cleaning Returned Equipment

Please help us protect the health and safety of our employees by cleaning and decontaminating equipment that has been subjected to potential biological or health hazards, and labeling such equipment. Unfortunately, we cannot service your equipment without such notification. Please complete and sign the form (or a similar statement certifying that the equipment has been cleaned and decontaminated) and send it to us with each instrument.

1. We recommend cleaning with only mild soaps that are compatible with the product materials. Wetted materials lists are provided on the product specification sheets. Clean all cables and remove all foreign matter.
2. Clean the cable connectors with a clean, dry cloth. Do not submerge the connectors.
3. Clean the instrument including the restrictor, sensor faces, and sonde body.



If an instrument is returned to our Service Center for repair or recalibration without a statement that it has been cleaned and decontaminated, or if it is the opinion of our Service Representatives that the equipment presents a potential health or biological hazard, we reserve the right to withhold service until proper certification is obtained.

## Decontamination & Cleaning Statement



|                                   |               |
|-----------------------------------|---------------|
| Company Name                      | Phone         |
| Address                           |               |
| City                              | State         |
| Instrument Type                   | Serial Number |
| Contaminant(s) if known           |               |
|                                   |               |
| Decontamination procedure(s) used |               |
|                                   |               |
| Cleaning verified by              | Title         |
| Date                              |               |

## More Information



To learn more about the Aqua TROLL 800, telemetry, software and other In-Situ products, see the resources listed below.

### **1** Visit [www.in-situ.com](http://www.in-situ.com)

Find information about In-Situ water quality, water level, telemetry and other products. Download software, manuals and product instructions.

### **2** View the [In-Situ YouTube channel](#).

Get video instructions for the Aqua TROLL 800 and other instruments. Watch Quick Start videos and other tutorials.

### **3** Call [In-Situ's technical support team](#).

For further instructions and help with technical questions, call the In-Situ support line at 1-970-498-1500.

# Declaration of Conformity



## In-Situ

Innovations in Water Monitoring

### CE Declaration of Conformity

Manufacturer: In-Situ, Inc.  
221 East Lincoln Avenue, Fort Collins, CO 80524, USA

**Declares that the following product:**

Product name: **Aqua TROLL 800**

Model: **Aqua TROLL 800**

Product Description: Multiparameter sonde for measuring water quality

Model Variants: No Pressure, Non-Vented and Vented variants. Sondes with pressure have variants based on pressure ranges the instrument was calibrated for (for example: 0-9m, 0-30m, etc.)

**is in compliance with the following Directive**

- 2014/30/EU EMC Directive
- Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive, 2011/65/EU and Commission Delegated Directive, (EU) 2015/863

**and meets or exceeds the following international requirements and compliance standards:**

**EMC Standards:**

EN 61326-1:2021

**RoHS Standard:**

EN 63000:2018

**The CE mark is affixed accordingly.**

David A. Bossie  
Regulatory Compliance Manager  
In-Situ, Inc.  
April 24, 2023



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## UKCA Declaration of Conformity

Manufacturer: In-Situ, Inc.  
221 East Lincoln Avenue, Fort Collins, CO 80524, USA

**We declare that the performance of the following product:**

Product name: Aqua TROLL 800

Model: Aqua TROLL 800

Product Description: Multiparameter sonde for measuring water quality.

Model Variants: No Pressure, Non-Vented and Vented variants. Sondes with pressure have variants based on pressure ranges the instrument was calibrated for (for example: 0-9m, 0-30m, etc.)

**is in compliance with the following Regulations:**

- EMC Regulation 2016
- Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Regulation (S.I. 2012:3032)

**and meets or exceeds the following British requirements and compliance standards:**

- **EMC:** BS 61326-1:2021
- **RoHS:** BS 63000:2018

The UKCA mark is affixed accordingly.

David A. Bossie  
Regulatory Compliance Manager  
In-Situ, Inc.  
April 24, 2023





# Appendix

## Appendix A: Parameter Numbers and Locations

| ID | Parameter Name                 | Holding Register Number | Holding Register Address | Default Units         |
|----|--------------------------------|-------------------------|--------------------------|-----------------------|
| 1  | Temperature                    | 5451                    | 5450                     | 1 = °C                |
| 2  | Pressure                       | 5458                    | 5457                     | 17 = PSI              |
| 3  | Depth                          | 5465                    | 5464                     | 38 = feet             |
| 4  | Level, Depth to Water          | 5472                    | 5471                     | 38 = feet             |
| 5  | Level, Surface Elevation       | 5479                    | 5478                     | 38 = feet             |
| 9  | Actual Conductivity            | 5507                    | 5506                     | 65 = $\mu\text{S/cm}$ |
| 10 | Specific Conductivity          | 5514                    | 5513                     | 65 = $\mu\text{S/cm}$ |
| 11 | Resistivity                    | 5521                    | 5520                     | 81 = ohm-cm           |
| 12 | Salinity                       | 5528                    | 5527                     | 97 = PSU              |
| 13 | Total Dissolved Solids         | 5535                    | 5534                     | 114 = ppt             |
| 14 | Density of Water               | 5542                    | 5541                     | 129 = $\text{g/cm}^3$ |
| 16 | Barometric Pressure            | 5556                    | 5555                     | 22 = mmHg             |
| 17 | pH                             | 5563                    | 5562                     | 145 = pH              |
| 18 | pH mV                          | 5570                    | 5569                     | 162 = mV              |
| 19 | ORP                            | 5577                    | 5576                     | 162 = mV              |
| 20 | Dissolved Oxygen Concentration | 5584                    | 5583                     | 117 = mg/L            |
| 21 | Dissolved Oxygen % Saturation  | 5591                    | 5590                     | 177 = % Saturation    |
| 24 | Chloride (Cl)                  | 5612                    | 5611                     | 117 = mg/L            |
| 25 | Turbidity                      | 5619                    | 5618                     | 194 = NTU             |
| 30 | Oxygen Partial Pressure        | 5654                    | 5653                     | 26 = torr             |

| <b>ID</b> | <b>Parameter Name</b>  | <b>Holding Register Number</b> | <b>Holding Register Address</b> | <b>Default Units</b> |
|-----------|--|--------------------------------|---------------------------------|----------------------|
| 31        | Total Suspended Solids   | 5661                           | 5660                            | 117 = mg/L           |
| 32        | External Voltage   | 5668                           | 5667                            | 163 = Volts          |
| 33        | Battery Capacity (remaining)   | 5675                           | 5674                            | 241 = %              |
| 34        | Rhodamine WT Concentration   | 5682                           | 5681                            | 118 = µg/L           |
| 35        | Rhodamine WT Fluorescence Intensity                                  | 5689                           | 5688                            | 257 = RFU            |
| 36        | Chloride (Cl <sup>-</sup> ) mV                                       | 5696                           | 5695                            | 162 = mV             |
| 37        | Nitrate as Nitrogen (NO <sub>3</sub> <sup>-</sup> -N) concentration  | 5703                           | 5702                            | 117 = mg/L           |
| 38        | Nitrate (NO <sub>3</sub> <sup>-</sup> ) mV                           | 5710                           | 5709                            | 162 = mV             |
| 39        | Ammonium as Nitrogen (NH <sub>4</sub> <sup>+</sup> -N) concentration | 5717                           | 5716                            | 117 = mg/L           |
| 40        | Ammonium (NH <sub>4</sub> ) mV                                       | 5724                           | 5723                            | 162 = mV             |
| 41        | Ammonia as Nitrogen (NH <sub>3</sub> -N) concentration               | 5731                           | 5730                            | 117 = mg/L           |
| 42        | Total Ammonia as Nitrogen (NH <sub>3</sub> -N) concentration         | 5738                           | 5737                            | 117 = mg/L           |
| 50        | Chlorophyll-a Concentration  | 5794                           | 5793                            | 118 = µg/L           |
| 51        | Chlorophyll-a Fluorescence Intensity                                 | 5801                           | 5800                            | 257 = RFU            |
| 54        | Blue Green Algae-Phycocyanin Concentration                           | 5822                           | 5821                            | 118 = µg/L           |
| 55        | Blue Green Algae-Phycocyanin Fluorescence Intensity                  | 5829                           | 5828                            | 257 = RFU            |
| 58        | Blue Green Algae-Phycoerythrin Concentration                         | 5850                           | 5849                            | 118 = µg/L           |

| <b>ID</b> | <b>Parameter Name</b>                                       | <b>Holding Register Number</b> | <b>Holding Register Address</b> | <b>Default Units</b> |
|-----------|---|--------------------------------|---------------------------------|----------------------|
| 59        | Blue Green Algae-Phycoerythrin Fluorescence Intensity       | 5857                           | 5856                            | 257 = RFU            |
| 67        | Fluorescein WT Concentration                                | 5913                           | 5912                            | 118 = µg/L           |
| 68        | Fluorescein WT Fluorescence Intensity                       | 5920                           | 5919                            | 257 = RFU            |
| 69        | Fluorescent Dissolved Organic Matter Concentration          | 5927                           | 5926                            | 118 = µg/L           |
| 70        | Fluorescent Dissolved Organic Matter Fluorescence Intensity | 5934                           | 5933                            | 257 = RFU            |
| 80        | Crude Oil Concentration                                     | 6004                           | 6003                            | 118 = µg/L           |
| 81        | Crude Oil Fluorescence Intensity                            | 6011                           | 6010                            | 257 = RFU            |
| 87        | Colored Dissolved Organic Matter Concentration              | 6053                           | 6052                            | 118 = µg/L           |

## Appendix B: Unit IDs

| ID   | Abbreviation       | Units                           |
|--|--------------------|---------------------------------|
| 1  | C                  | Celsius                         |
| 2  | F                  | Fahrenheit                      |
| 3  | K                  | Kelvin                          |
| <b>Pressure, Barometric Pressure (17-32)</b> |                    |                                 |
| 17   | PSI                | Pounds per square inch          |
| 18   | Pa                 | Pascals                         |
| 19   | kPa                | Kilopascals                     |
| 20   | Bar                | Bars                            |
| 21   | mBar               | Millibars                       |
| 22   | mmHg               | Millimeters of Mercury (0 to C) |
| 23   | inHg               | Inches of Mercury (4 to C)      |
| 24   | cmH <sub>2</sub> O | Centimeters of water (4 to C)   |
| 25   | inH <sub>2</sub> O | Inches of water (4 to C)        |
| 26   | Torr               | Torr                            |
| 27   | atm                | Standard atmosphere             |
| <b>Distance/Length (33-48)</b>               |                    |                                 |
| 33   | mm                 | Millimeters                     |
| 34   | cm                 | Centimeters                     |
| 35   | m                  | Meters                          |
| 36   | km                 | Kilometer                       |
| 37   | in                 | Inches                          |
| 38   | ft                 | Feet                            |
| <b>Coordinates (49-64)</b>                   |                    |                                 |
| 49   | deg                | Degrees                         |
| 50   | min                | Minutes                         |
| 51   | sec                | Seconds                         |

| <b>Conductivity (65-80)</b>                         |                   |                               |
|---|-------------------|-------------------------------|
| 65  | μS/cm             | Microsiemens per centimeter   |
| 66  | mS/cm             | Millisiemens per centimeter   |
| <b>Resistivity (81-96)</b>                          |                   |                               |
| 81  | ohm-cm            | Ohm-centimeters               |
| <b>Salinity (97-112)</b>                            |                   |                               |
| 97  | PSU               | Practical Salinity Units      |
| 98  | ppt               | Parts per thousand salinity   |
| <b>Concentration</b>                                |                   |                               |
| 113   | ppm               | Parts per million             |
| 114   | ppt               | Parts per thousand            |
| 115   |                   | (Available)                   |
| 116   |                   | (Available)                   |
| 117   | mg/L              | Milligrams per liter          |
| 118   | μg/L              | Micrograms per liter          |
| 119   | ---               | (Deprecated)                  |
| 120   | g/L               | Grams per liter               |
| 121   | ppb               | Parts per billion             |
| <b>Density (129-144)</b>                            |                   |                               |
| 129   | g/cm <sup>3</sup> | Grams per cubic centimeter    |
| <b>pH (145-160)</b>                                 |                   |                               |
| 145   | pH                | pH                            |
| <b>Voltage (161-176)</b>                            |                   |                               |
| 161   | μV                | Microvolts                    |
| 162   | mV                | Millivolts                    |
| 163   | V                 | Volts                         |
| <b>Dissolved Oxygen (DO) % Saturation (177-192)</b> |                   |                               |
| 177   | % sat             | Percent saturation            |
| <b>Turbidity (193-208)</b>                          |                   |                               |
| 193   | FNU               | Formazin nephelometric units  |
| 194   | NTU               | Nephelometric turbidity units |
| 195   | FTU               | Formazin turbidity units      |

**Flow (209-224)**

|     |                      |   |
|-----|----------------------|---|
| 209 | ft <sup>3</sup> /s   | Cubic feet per second                     |
| 210 |                      | (Available - was Cubic feet per minute)   |
| 211 |                      | (Available - was Cubic feet per hour)     |
| 212 | ft <sup>3</sup> /day | Cubic feet per day                        |
| 213 | gal/s                | Gallons per second                        |
| 214 | gal/min              | Gallons per minute                        |
| 215 | gal/hr               | Gallons per hour                          |
| 216 | MGD                  | Millions of gallons per day               |
| 217 | m <sup>3</sup> /sec  | Cubic meters per second                   |
| 218 |                      | (Available - was Cubic meters per minute) |
| 219 | m <sup>3</sup> /hr   | Cubic meters per hour                     |
| 220 |                      | (Available - was Cubic meters per day)    |
| 221 | L/s                  | Liters per second                         |
| 222 | ML/day               | Millions of liters per day                |
| 223 | mL/min               | Milliliters per minute                    |
| 224 | kL/day               | Thousands of liters per day               |

**Volume (225-240)**

|     |                 |                     |
|-----|-----------------|---------------------|
| 225 | ft <sup>3</sup> | Cubic feet          |
| 226 | gal             | Gallons             |
| 227 | Mgal            | Millions of gallons |
| 228 | m <sup>3</sup>  | Cubic meters        |
| 229 | L               | Liters              |
| 230 | acre-ft         | Acre feet           |
| 231 | mL              | Milliliters         |
| 232 | ML              | Millions of liters  |
| 233 | kL              | Thousands of liters |
| 234 | Acre-in         | Acre inches         |

**% (241-256)**

|     |   |         |
|-----|---|---------|
| 241 | % | Percent |
|-----|---|---------|

**Fluorescence (257-2720)**

|     |     |                             |
|-----|-----|-----------------------------|
| 257 | RFU | Relative Fluorescence Units |
|-----|-----|-----------------------------|

**Low-Flow (273-288)**

|     |        |                        |
|-----|--------|------------------------|
| 273 | mL/sec | Milliliters per second |
| 274 | mL/hr  | Milliliters per hour   |
| 275 | L/min  | Liters per minute      |
| 276 | L/hr   | Liters per hour        |

**Current (289-304)**

|     |         |           |
|-----|---------|-----------|
| 289 | $\mu$ A | Microamps |
| 290 | mA      | Milliamps |
| 291 | A       | Amps      |

**Velocity (305-320)**

|     |      |                   |
|-----|------|-------------------|
| 305 | ft/s | Feet per second   |
| 306 | m/s  | Meters per second |